MODERN Machine Shop

MAY, 1953

The only perfect, mathematically designed boring tool on the market *for mass production boring and internal threading*

THE BOKUM BORING TOOL

The cutting heads of Bokum Tools were designed to give you fast performance, economy in production, and efficiency in results.

Repeated resharpenings (one face only) does not change the scientifically-engineered helical form. Thus the clearance remains constant throughout life of tools — and they *do* have a long life.

Available in:

- Super high-speed steel
- Carbide-tipped
- Solid tungsten carbide
- For boring holes from 1/16" diameter up.
- Put up in sets of desired tool sizes and types, in quantity assortments to suit.
- Special holders for specific uses.
- Send for complete catalog.

TRADE MARK REG. U. S. PAT. OFF.

BOKUM TOOL CO.

SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

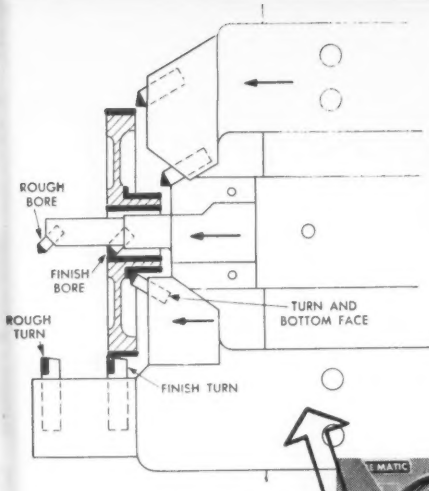
DEPT. H 14775 WILDEMERE AVE. DETROIT 21, MICH.

multiple surfaces get the

ALL-OVER

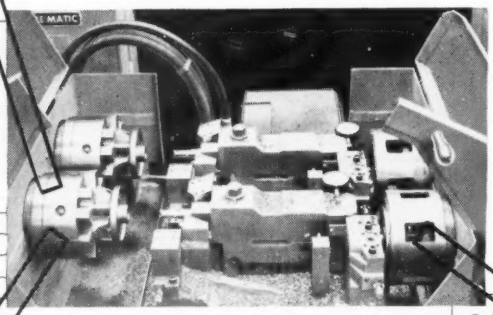
borizing treatment

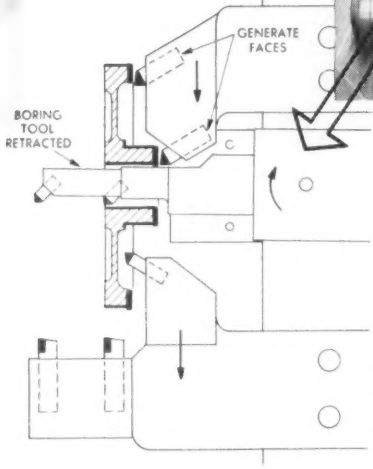
Model 222 Bore-Matic precision finishes helical gear blanks on all contact surfaces in continuous-production setup



1st Operation, left end stations: load, table rapid traverses left, slows to rough bore and turn, then slows further to finish bore, turn and bottom face, as shown above.

2nd Operation, left end stations: contact switch starts cross-slide forward to generate face of part, automatically shifting bridged-over dial-bar boring tool to eliminate drag line, as shown below.

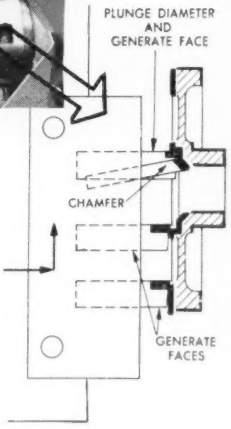




With the tooling arrangement shown above, this four-station, double-end machine turns out precision borized cast iron gear blanks two at a time — with no time out for loading and unloading.

Each blank is bored, faced, turned and chamfered on a total of eleven surfaces. Parts are bored, turned and faced on flange end at the two left-hand stations, both 1st and 2nd operations being done at each station. Then parts are transferred to the right-hand stations for the remaining operations. The operator is able to load one end while the other end is borizing, eliminating handling time from the work cycle. The machine cycle and sequence of operations are illustrated in the accompanying diagrams.

Remember—when it comes to precision finishing, it pays to come to Heald.



For final operation on right end of machine, table rapid traverses right and cross slide indexes to rear to finish two faces and a chamfer, as shown above.

HEALD

Case Study No. 2238-96 in **PRECISION PRODUCTION**

INTERNAL AND ROTARY SURFACE GRINDING MACHINES AND BORE-MATICS

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

VOLUME 25 NUMBER 12
MAY, 1953

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MODERN Machine Shop

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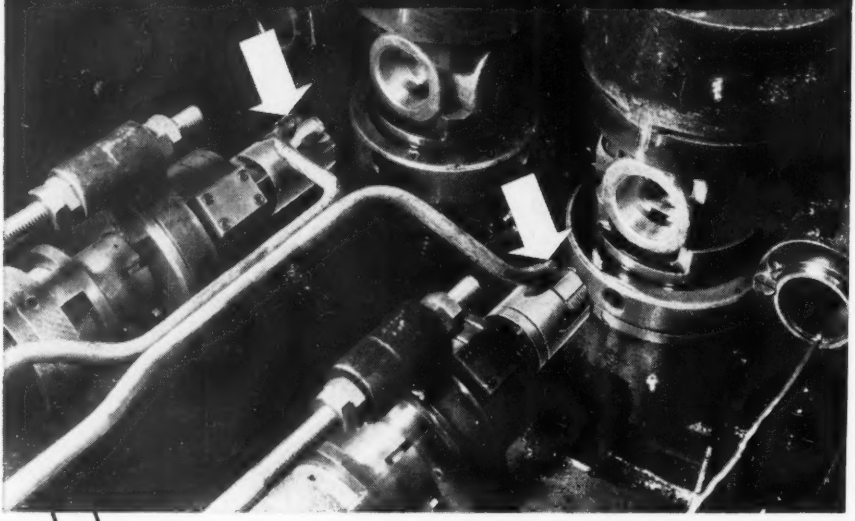
LANDIS TAP MASS-PRODUCES THREADS RATED FOR 6,000 POUNDS PRESSURE



W-S forged steel pipe fittings guarantee the uninterrupted flow upon which the economy and safety of modern service and process piping lines depend. LANDIS Taps are regularly used by the Watson-Stillman Fittings Division, H. K. Porter Company, Inc., of Roselle, N. J., to cut the precision threads in these fittings required to withstand high pressures without leaks.

In the illustration, LANDIS LL Rotary Taps on a special drilling and tapping machine are threading W-S 2" 90° Pipe Elbows. 2" 11½ pitch ASTP threads are tapped in steel forgings at the rate of 35 surface feet per minute. Even at this speed 4000 threads are completed between chaser grinds, holding tool cost and downtime to a minimum.

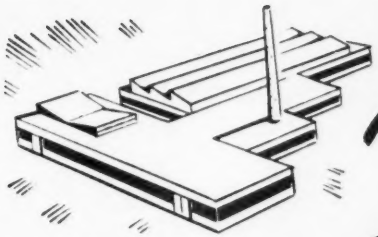
LANDIS LL Taps are designed for the highspeed production of precision tapered threads. The taper of the threads is mechanically controlled by the receding action of the chasers. Cutting strains are thereby reduced, thread accuracy and finish improved, and chaser life lengthened. The design of the ALM Head features unevenly spaced chasers which provide maximum rigidity and prevent chatter.

Detachable heads allow each size of Tap to produce a wide range of thread diameters. For example, the 2" LL Tap with different size heads will cut pipe threads from 1" to 2½". Both Rotary and Stationary models are built in sizes up to 13⅜".

Write for Bulletin G-95

LANDIS *Machine* CO. 50TH ANNIVERSARY **WAYNESBORO PENNSYLVANIA**

333

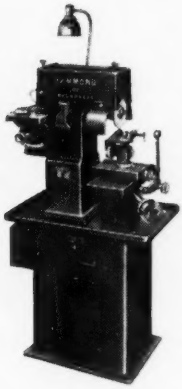


The Choice of

AMERICA'S LEADING MANUFACTURERS

Hammond

CARBIDE TOOL and CHIP BREAKER GRINDERS

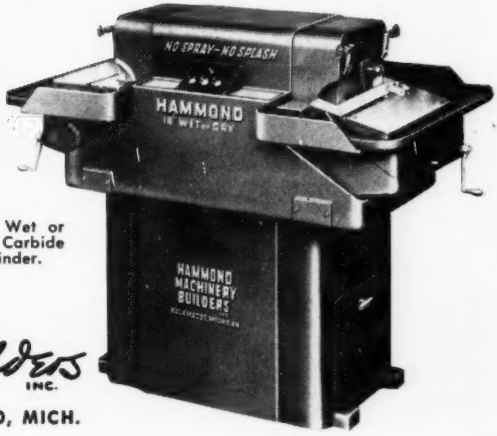


CB-77 Chip Breaker and Diamond Finishing Grinder.

SAVE TIME · TOOLS · WHEELS with America's "Choice" and most complete line of Carbide Tool, Chip Breaker and Diamond Finishing Grinders. *Over 6,000 in service.*

Clip this ad to your letterhead and Carbide Grinder Catalog No. 225 will be sent **by return mail.**

WD-10 Wet or Dry 10" Carbide Tool Grinder.

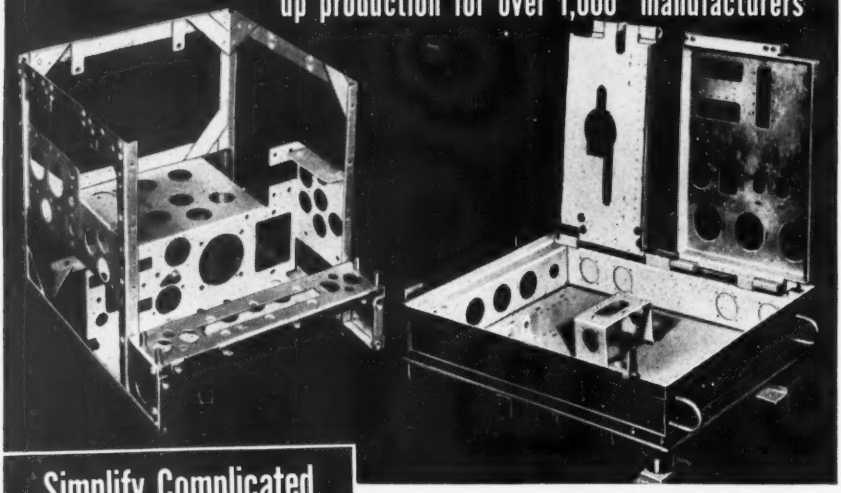


14-WD Wet or Dry 14" Carbide Tool Grinder.

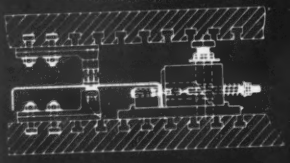
Hammond Machinery Builders INC.

1615 DOUGLAS AVE., KALAMAZOO, MICH.

Whistler Adjustable and Magnetic Perforating Dies are stepping up production for over 1,000 manufacturers



Simplify Complicated Piercing Operations



Use this HU-50 90° Perforating Unit on the same job with other Whistler Dies . . . often saves extra press operations.

USE WHISTLER Adjustable and Magnetic Dies for perforating, notching and slotting sheet metals . . . fast, accurate and cost cutting. Complicated patterns can be set up quickly. Hole arrangements can be changed in the press . . . without waiting and at no extra die cost. New HU-50 units, that pierce at 90° angle, can be used in conjunction with standard perforating equipment. Fewer press operations are necessary.

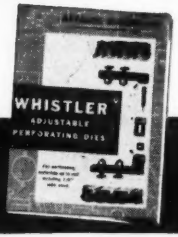
Re-use the same dies in different arrangements on many jobs. Punches and dies are interchangeable.

Whistler Adjustable Dies can be used in practically every type press. Standard sizes and shapes of punches and dies available up to 3 inches. Special sizes and shapes to order.

S. B. WHISTLER & SONS, Inc.

740 Military Road

Buffalo 23, New York



For prices and application data on this modern way to speed production and cut unit costs, write for these illustrated Whistler catalogs.

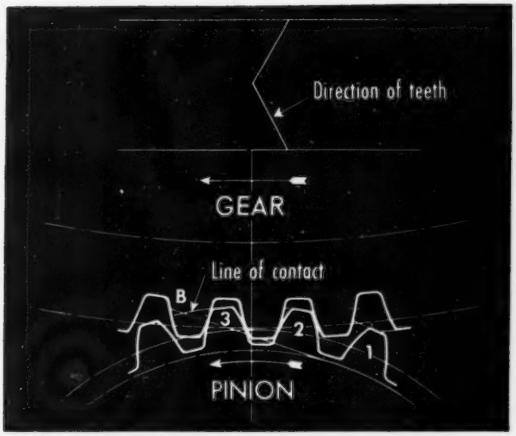


DIAGRAM FOR LONGER-LASTING GEARS

This diagram illustrates the nature of the contact between a pair of Farrel-Sykes gears, and shows why they continue to operate smoothly after many years of service.

The lines of contact are oblique across the face of the teeth, and the pressure is evenly distributed over each tooth, from tip to working depth line. This means that there is no tendency for the contour of the teeth to wear unevenly. Precision manufacture and the use of highest grade materials also contribute to long gear life.

Farrel engineers will be glad to assist you in working out unusual gear problems. Write for further information.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia & Derby, Conn., Buffalo, N.Y.

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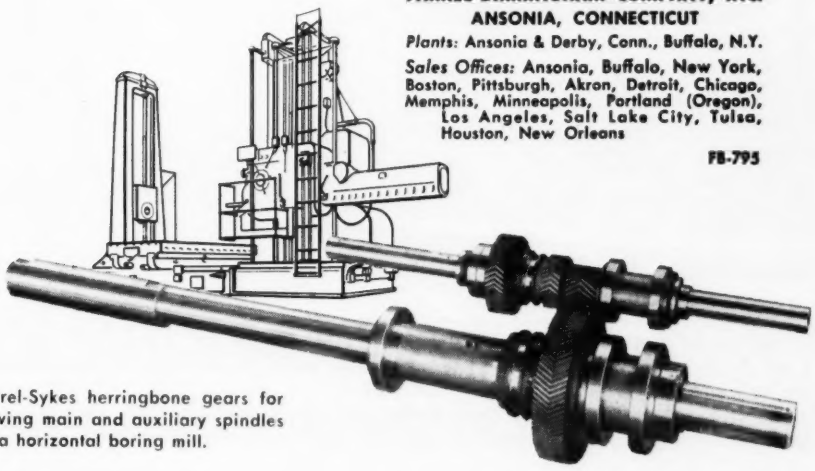
FB-795



Farrel-Sykes herringbone gears for driving main and auxiliary spindles of a horizontal boring mill.

40 YEARS

OF LEADERSHIP

Management and employes take pride in announcing to our many friends and customers that Eclipse Counterbore Company became 40 years of age in May. From a humble beginning in 1913 to a position of leadership in 1953, Eclipse is today truly synonymous with quality in the cutting tool industry. This healthy maturity could never have been attained without the help of those same friends and customers . . . and so to them we say "Sincere Thanks."

The orginal Eclipse interchangeable single-diameter counterbore created in 1913.

A modern multi-diameter carbide tipped Eclipse Cutter.

1913

1953

ECLIPSE COUNTERBORE CO.

Founded in 1913

DETROIT 20, MICHIGAN

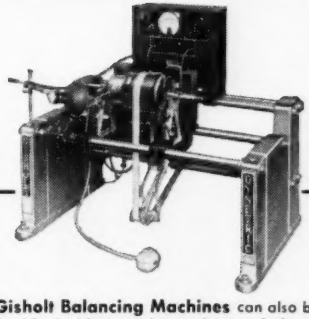
the final *check* for every rotating part...

Maybe it's a crankshaft or an armature . . . perhaps a fan or a belt pulley. No matter. The important thing is this: If it isn't *balanced*, it isn't ready for service.

Smooth operation and long life require that accurate static and dynamic balance be rated right along with mechanical specifications to assure the efficiency of the finished product.

Gisholt Balancing Machines can locate and measure unbalance vibrations down to .000025" with simple readings . . . handle any assembly from ½ ounce to 50 tons.

The cost? Very moderate. Let Gisholt Balancing Machines provide the final check. Write us.



Gisholt Balancing Machines can also be furnished with correction equipment designed to meet your specific requirements.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

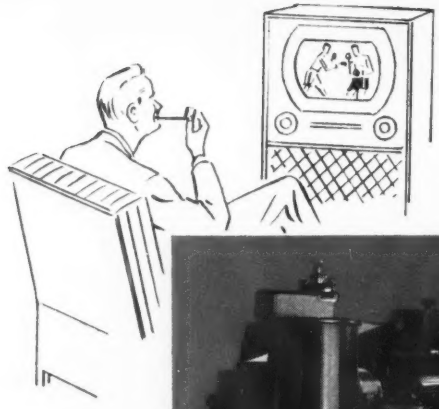
GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

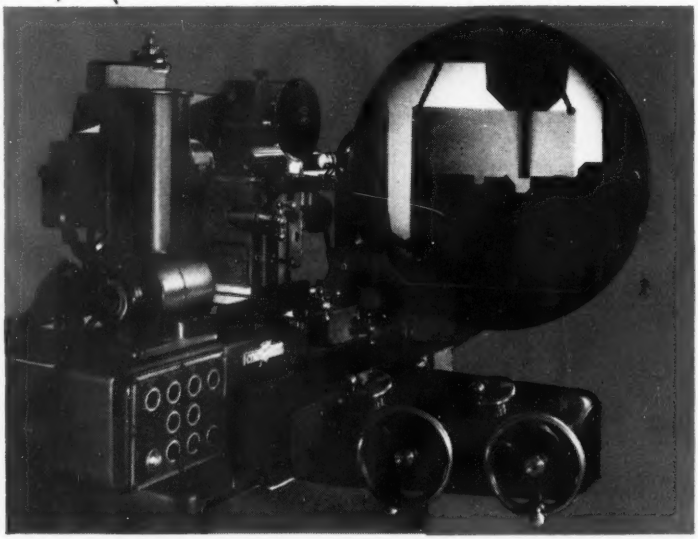
DYNETRIC BALANCERS — GISHOLT — DEVELOPED JOINTLY WITH WESTINGHOUSE ELECTRIC CORPORATION "DYNETRIC" IS A TRADE MARK REG. U. S. PAT. OFFICE BY WESTINGHOUSE ELECTRIC CORPORATION

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

RIGHT ON

. . . Projecto-Form a 20X view

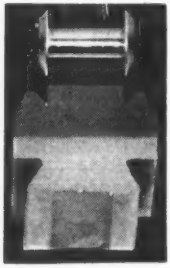




CINCINNATI

TIME 60% SAVED

Projecto-Form reduced the time to grind this form tool by 60%.



TIME 68% SAVED

Only four hours' grinding time required on the profile of the die for this part — 30% of the former time.

TIME 70% SAVED

Entire contour of blanking punch ground by the Projecto-Form method. Time reduced by 68%.

CINCIN

THE NOSE

gives you of accuracy

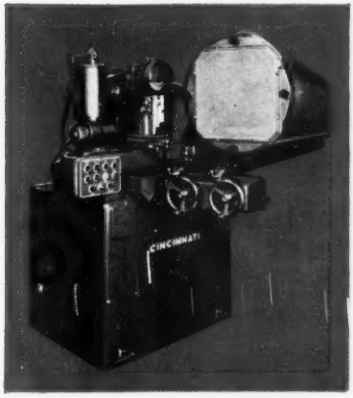
CINCINNATI Projecto-Form, for accurately grinding tool and die parts.

Enlargement:
with Standard projection lens.. 20X
with Special projection lens.... 40X

Standard width of grind, one setting ..... 9/10"

Maximum longitudinal adjustment 4½"

Complete specifications in catalog No. M-1612-3.



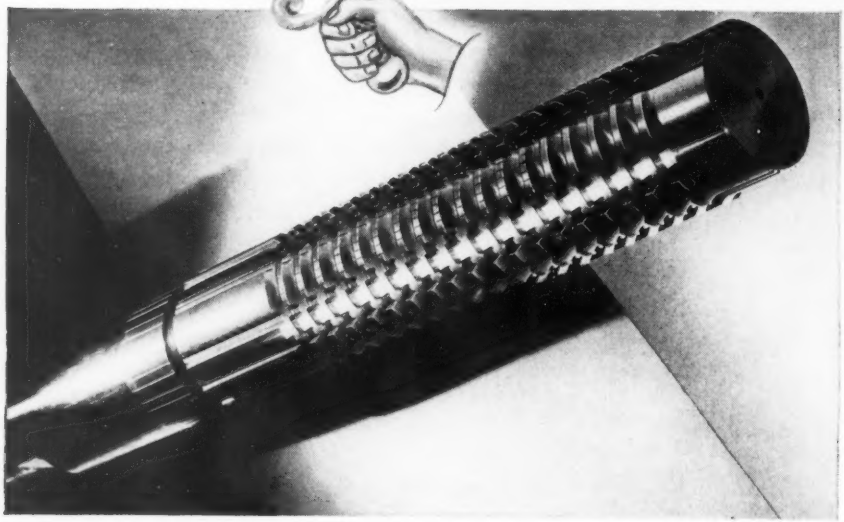
Like television, CINCINNATI Projecto-Form Grinding Machines eliminate a lot of intermediate steps and show you exactly what's happening at the point of action. Through an arrangement of lenses and a mirror, an intense light projects a silhouette of the work and wheel to a ground glass screen in front of which the operator is seated. A "drawing" of the desired contour, twenty times size, is cut on a glass plate coated with a tinted translucent emulsion. Mounted on the viewing screen, the drawing furnishes a guide to which the operator works. With two micrometer adjusting handwheels, he adjusts the wheelhead vertically and transversely while the grinding wheel reciprocates over the work. Grinding continues until the image of the work matches the drawing. ¶ The Projecto-Form method of grinding greatly reduces the cost of producing accurate form tools, die parts, and others. Illustrated on the opposite page are typical examples, and the time saved over previous methods. You may obtain complete specifications by writing for catalog No. M-1612-3. Brief data in Sweet's Machine Tool Catalog.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

NATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

CONNECTICUT
DURAKEEN
BROACHES



MORE PIECES PER GRIND ● MORE GRINDS PER BROACH
BETTER QUALITY WORK

The real extent of the manufacturing economies a fine broach makes possible is still a field of rich surprises . . . especially when you mount a Connecticut Durakeen Broach on any of your machines.

From surface to core, a Durakeen Broach gives you the sharp, hard teeth with correct undercut for unbroken chip curling, the differential tooth spacing that prevents broach chatter and wave, the absolutely straight body that insures smooth, true travel. Durakeen, heat treated by skilled operators to exact exposures, is our finest steel . . . your guarantee of highest quality work. "Better Broach it with Connecticuts!"

THE CONNECTICUT BROACH AND MACHINE COMPANY
NEW LONDON, CONNECTICUT

TCB53A

Adapt Any Milling Machine For POWER ROTARY MILLING

KNIGHT'S *Power Feed* ROTARY TABLES

- **Completely Self-Contained Motor Driven Units**
- **No Set-Up Time — No Special Equipment**
- **Just Plug Into Nearest Electric Outlet**

Especially designed for fast, precision Cycle Milling and Indexing—Continuous Face Milling—Cam Milling—Other special purpose jobs that require an Automatic Revolving Fixture. An exceptional time and labor saver!

20" MODEL: 18 quick-feed changes, 1½" to 52", or 3" to 108"

42" MODEL: Infinite variable feed. Table can be increased to 72" with sub-plates.

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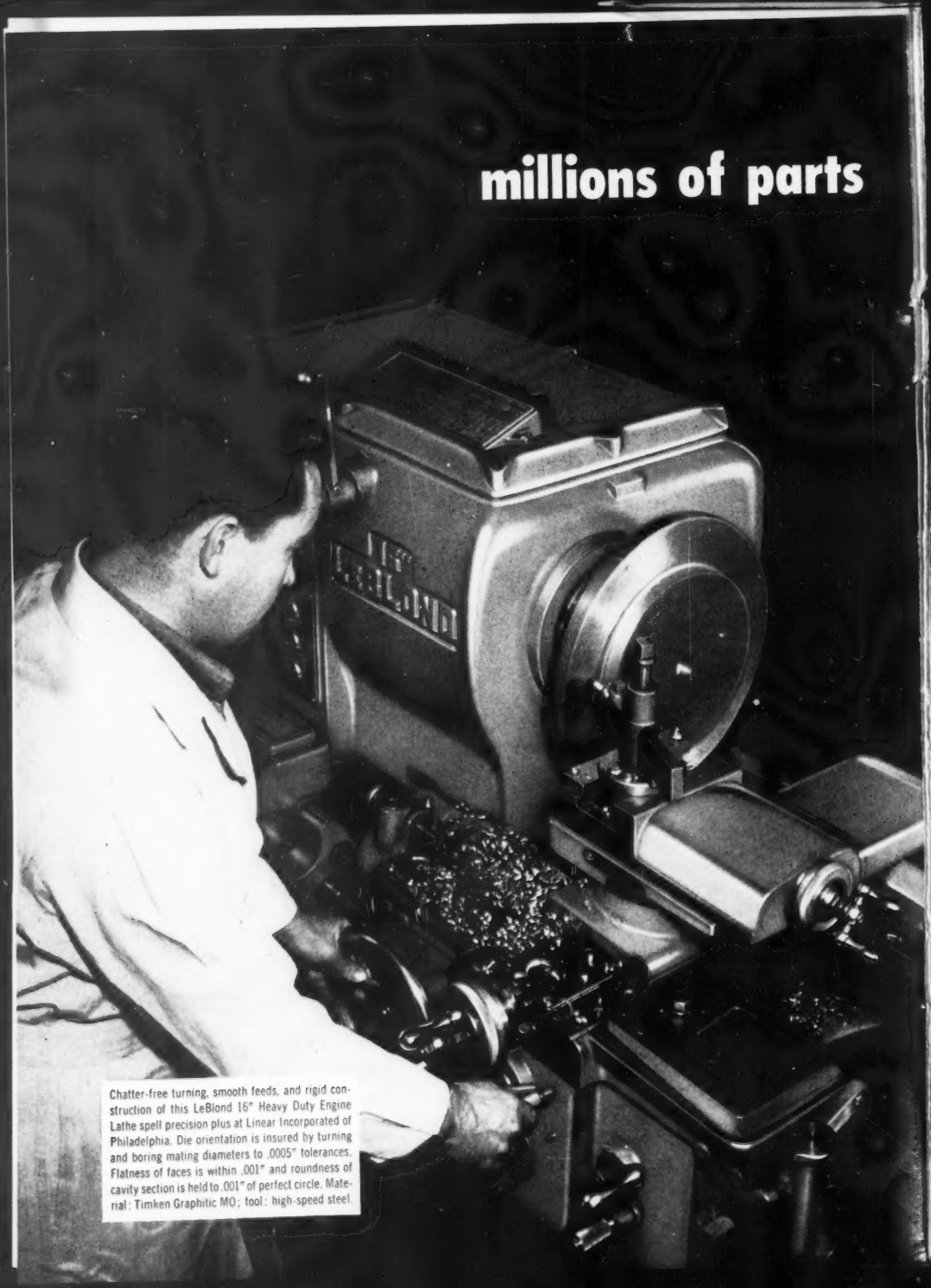
Send information on Power-Feed Rotary Tables

NAME .....

TITLE .....

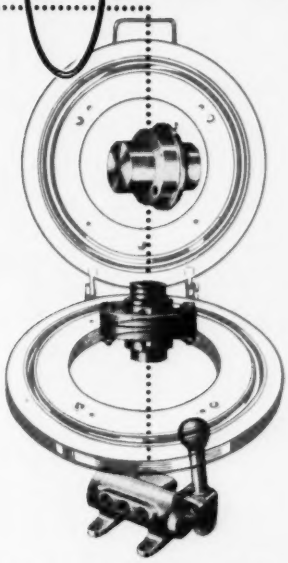
☐ Also send details on Knight Milling Machines

millions of parts



Chatter-free turning, smooth feeds, and rigid construction of this LeBlond 16" Heavy Duty Engine Lathe spell precision plus at Linear Incorporated of Philadelphia. Die orientation is insured by turning and boring mating diameters to .0005" tolerances. Flatness of faces is within .001" and roundness of cavity section is held to .001" of perfect circle. Material: Timken Graphitic MO; tool: high-speed steel.

are married with rings like these



Industry needs sealing rings to "marry" millions of parts against leakage of air, liquid, and gas. Seals, for example, like the rubber "O" rings made by Linear Incorporated of Philadelphia. They're vital to the successful operation of hydraulic mechanisms, air-operated devices, and chemical processing equipment . . . to name just a few applications. And industry says, "Make these sealing rings to precision tolerance for non-leakage. Deliver the millions we need at low cost."

Linear experimented . . . found that "O" rings with the required finish and roundness could be mass-produced easily enough . . . but to turn them out at low cost demanded virtual elimination of hand-finishing operations. The problem called for dies made to tolerances that would deliver cross-sectional roundness conforming to nearly "perfect circle," mating diameters so accurate that perfect die orientation could be achieved.

Then Linear installed their new 16" LeBlond Heavy Duty Engine Lathe. This profit-building lathe is saving expensive toolroom time and delivering cavity finish on Linear's dies as fine as 10 microinches, mating diameters to the required .0005" whisker of tolerance, cross sectional roundness within .001" of perfect circle. Costly die-finishing time at Linear is down . . . flash-removing second operations on "O" rings are at a bone-bare profit-making minimum. It's a case of chatter-free turning, smooth-as-silk feeds, and rigid construction.

LeBlond features like hardened and ground self-compensating steel bed ways, totally enclosed quick-change box, one-piece apron and a host of others will insure Linear a lifetime of this same smooth-turning performance.

Whether you need unfaltering accuracy or high output rapid production, there's a LeBlond lathe that will fill the bill. Your nearby LeBlond distributor will tell you about our complete line. Call him or write

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

Ask for Bulletin HD125 E
for more information on the 16"
LeBlond Heavy Duty Engine Lathe

turned faster by

LeBLOND
of Cincinnati

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 64 YEARS

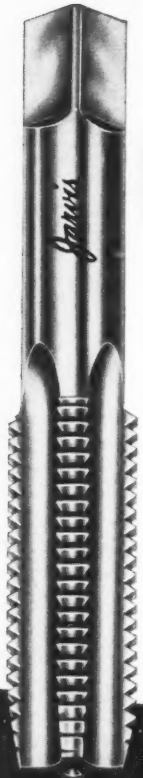
ACCURATE SQUARES

CONCENTRIC SHANKS

UNIFORM FLUTE SPACING

CONTROLLED HOOK

PRECISION GROUND CHAMFER



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Jarvis TAPS

AN INDUSTRIAL TAP FOR INDUSTRIAL USERS

JARVIS POWER TOOLS

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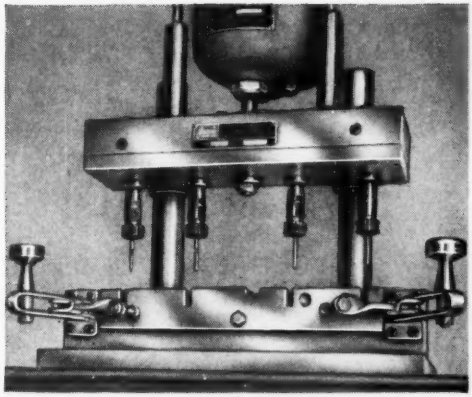
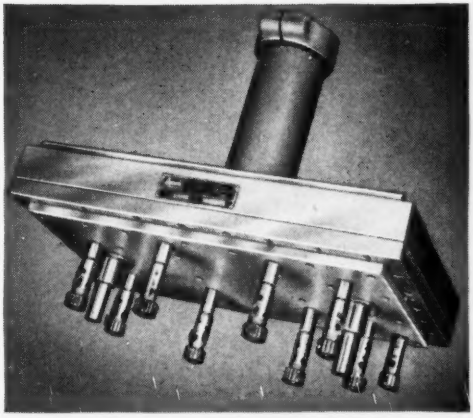
THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

For Multiple Tapping and Drilling . . .



AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

Jarvis MULTI-TAPPERS



Engineered and built to your specific production requirements from our basic standard components, Jarvis Multi-Tappers can be furnished for any type of drill press available.

We invite your inquiries—let us assist in analyzing your tapping and drilling needs!

Send for our catalog featuring Jarvis Multi-tappers

NEW FEATURES OF JARVIS MULTI-TAPPERS

include:

- Aluminum case—Jig bored.
- Gear driven—positive action, silent drive.
- Ball bearings throughout.

WHEN POWERED WITH A JARVIS TORQOMATIC DRIVE THE JARVIS MULTI-TAPPER PROVIDES THE MOST EFFICIENT AND PRODUCTIVE MACHINE IN THE FIELD.

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

on your nut setting operations...

One-piece, precision-built Apex SN Nut Setters offer several advantages not found in two-piece socket-extension combinations. Power is applied direct from gun to work . . . full torque is developed . . . operation is faster, safer—and easier on tools and on tool operators. There are no movable parts, joints or locking devices to cause vibration, backlash and excessive loss of torque.

Apex SN Nut Setters are available with the following hex shank drives—$\frac{1}{4}$" (standard and bolt-clearance type); $\frac{7}{16}$", $\frac{5}{8}$" and $\frac{3}{4}$" (standard type). Broached openings, Hexagon: $\frac{3}{16}$" to $1\frac{1}{2}$"; Square: $\frac{1}{4}$" to $\frac{7}{8}$". If your power tools take a hex shank, you can use Apex SN Nut Setters on your work, and save time, money and manpower—now!

CATALOG 29 contains complete information, specifications and illustrations of over 5,000 Apex impact sockets, extensions, adapters, universal joints and other production tools. Write, on your company letterhead please, for your copy.

APEX TOOLS sockets, extensions, adapters

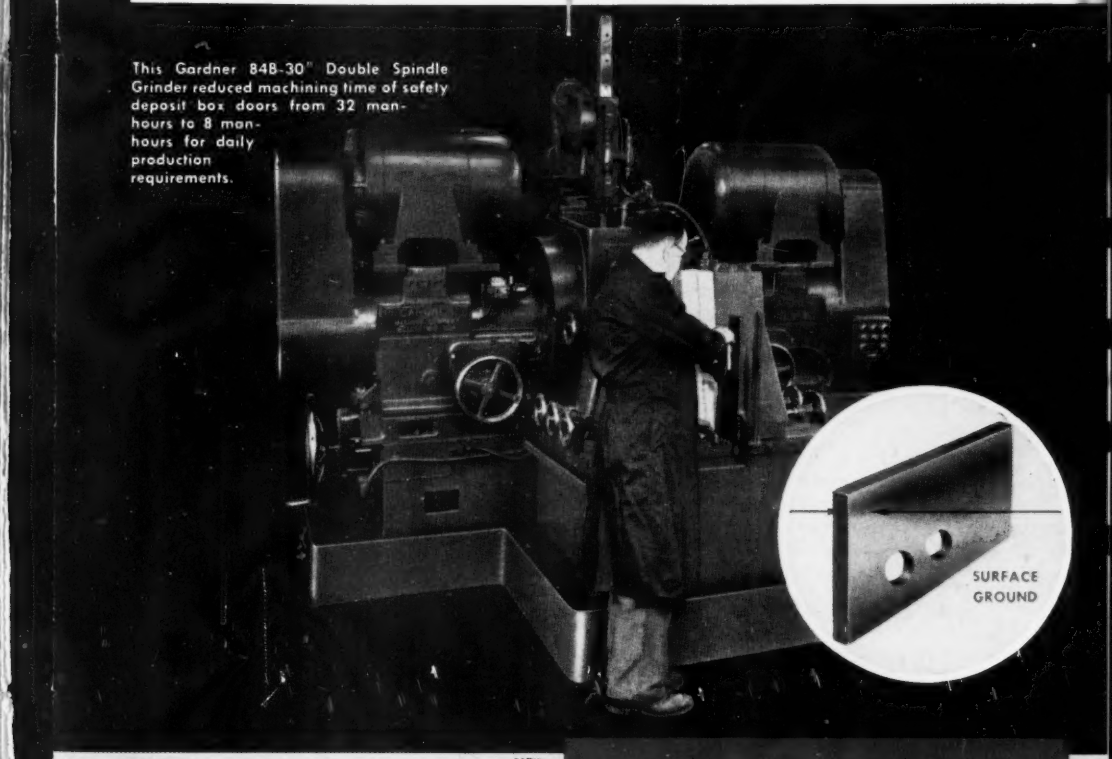
THE APEX MACHINE & TOOL COMPANY
1027 S. Patterson Blvd., Dayton 2, Ohio

Power Bits, Insert Bits and Bit Holders, for Phillips, Frearson (Reed & Prince), Slotted, Clutch Head and Socket Head Screws • Hand Drivers for Phillips, Frearson and Clutch Head Screws • Two-Piece Drivers for Hex Head Screws • Sockets, Extensions, Adapters and Nut Setters • Universal Sockets, Extension Wrenches and Adapters • Aircraft and Industrial Universal Joints • Self-Releasing and Adjustable Stud Setters • Safety Friction Tapping Chucks • Vertical Float Tapping Chucks.

GARDNER GRINDING Replaces Combined Milling-Surface Grinding

CUTS COST 75%!

TWO Surfaces Ground in ONE Operation



This Gardner 84B-30" Double Spindle Grinder reduced machining time of safety deposit box doors from 32 man-hours to 8 man-hours for daily production requirements.

117M

JOB DATA

MACHINE: Gardner 84B-30" Double Spindle Grinder.

PRODUCTION AVERAGE: 4 to 6 pieces per minute per cut for doors up to 6" x 10"; maximum work size, 12" x 12".

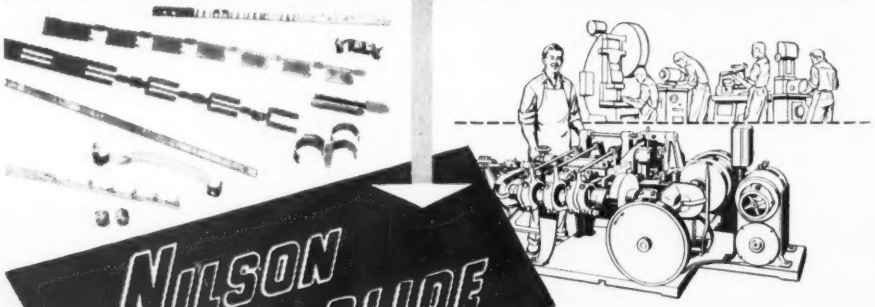
TOLERANCE: .001" to .002" for parallelism. .005" for uniformity.

For help with your flat surfacing problems, send us your blueprints for production estimates and tooling suggestions.

GARDNER MACHINE COMPANY
428 Gardner St., Beloit, Wisconsin, U.S.A.

GARDNER
precision disc **Grinders**

Save Metal | *Save Labor*



NILSON FOUR-SLIDE

Wire and Ribbon Metal
FORMING MACHINES

Mounting production costs are driving firms out of the competitive picture. Too much scrap metal! Too many single operation machines! Too many operators! This whole picture can be changed to a highly profitable operation.

Install a NILSON combination press and 4-Slide forming machine. This machine takes wire or ribbon metal directly from the coil, straightens, feeds, pierces, blanks, swages, stamps, or coins, cuts off and forms . . . *automatically* in one quick precise operation. See the new picture? . . . Increased production! Minimum scrap metal! One machine for *all* operations! One operator!

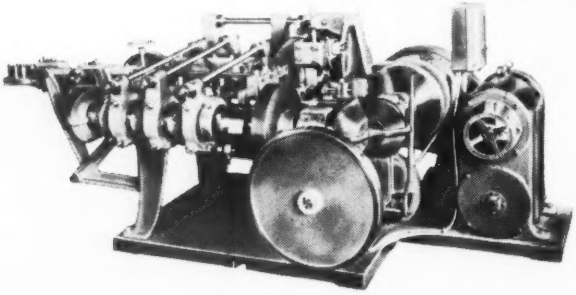
For specific recommendations... send details of your operation.

THERE'S NOTHING LIKE A **NILSON**

NILSON has been specializing in Forming Equipment for over 50 years.

THE A. H. NILSON MACHINE COMPANY

1514 Railroad Avenue
Bridgeport 5, Connecticut

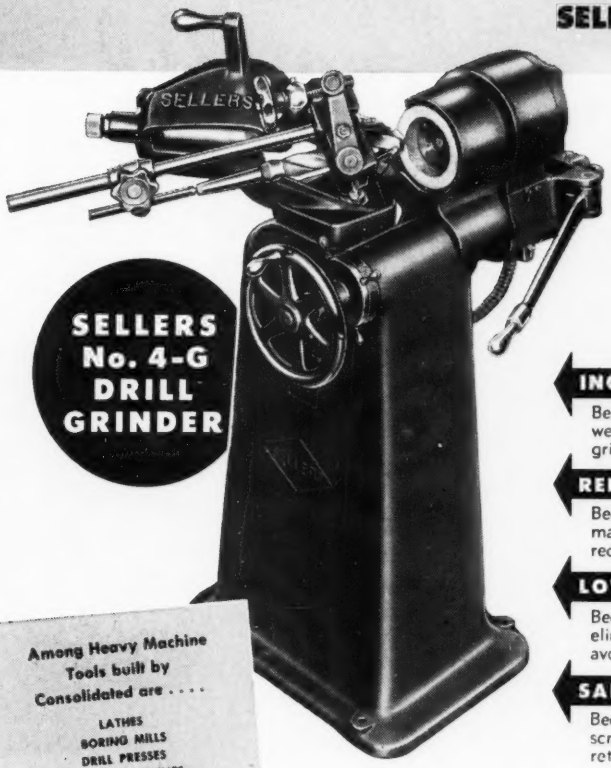


CHICAGO
CLEVELAND
DETROIT
LOS ANGELES
HAMILTON, ONT., CANADA

Want better drill performance?

Then try grinding your drills on the grinders used and recommended by leading drill manufacturers.....

SELLERS DRILL GRINDERS



SELLERS No. 4-G DRILL GRINDER

INCREASE PRODUCTION

Because Sellers correctly ground drills can be safely run at maximum speeds, they increase machine output.

LENGTHEN DRILL LIFE

Because with Sellers grinding, angles and clearances are correct, drill lips cut equally and efficiently, wear is minimized, less stock is removed when grinding, doubling drill life.

INCREASE HOLES PER GRIND

Because Sellers correct grinding reduces wear, drills remain sharp longer, require less grinding.

REDUCE OVERHEAD AND LABOR

Because Sellers precision grinding increases machine production, drilling costs are reduced.

LOWER ASSEMBLY COSTS

Because under- and over-size holes can be eliminated, reaming or bushing correction is avoidable, saving time and labor.

SALVAGE DAMAGED DRILLS

Because burned and broken drills ordinarily scrapped can be satisfactorily reclaimed and returned to profitable service.

Among Heavy Machine Tools built by Consolidated are ....

- LATHES
- BORING MILLS
- DRILL PRESSES
- MILLING MACHINES
- BORING MACHINES
- COLD SAW MACHINES
- BORING, DRILLING AND MILLING MACHINES
- DRILL AND TOOL GRINDERS
- PLANERS
- SLOTTERS
- RAILROAD SHOP TOOLS
- AUTOMOTIVE TOOLS
- AND OTHER SPECIAL MACHINES

A self-contained dry grinder, the Sellers No. 4-G has a proved record of top efficiency for grinding right hand and flat twist drills, 2, 3 and 4 lip up to 2" diameter. It has an actual maximum capacity for 2 and 4 lip drills up to 3" diameter and 3 lip up to 2⅞" diameter. Lips are ground to equal length, angle and clearance. Clearance as produced by the Sellers Method, automatically determined by the machine for different size drills, is sufficient to insure free cutting without weakening the cutting edges. Part replacement is negligible but, if ever required, replacement parts are always available. Complete information will be furnished upon request.

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED MACHINE TOOL CORPORATION

SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK

"It all adds up to this:

MORSE ELECTROLIZED

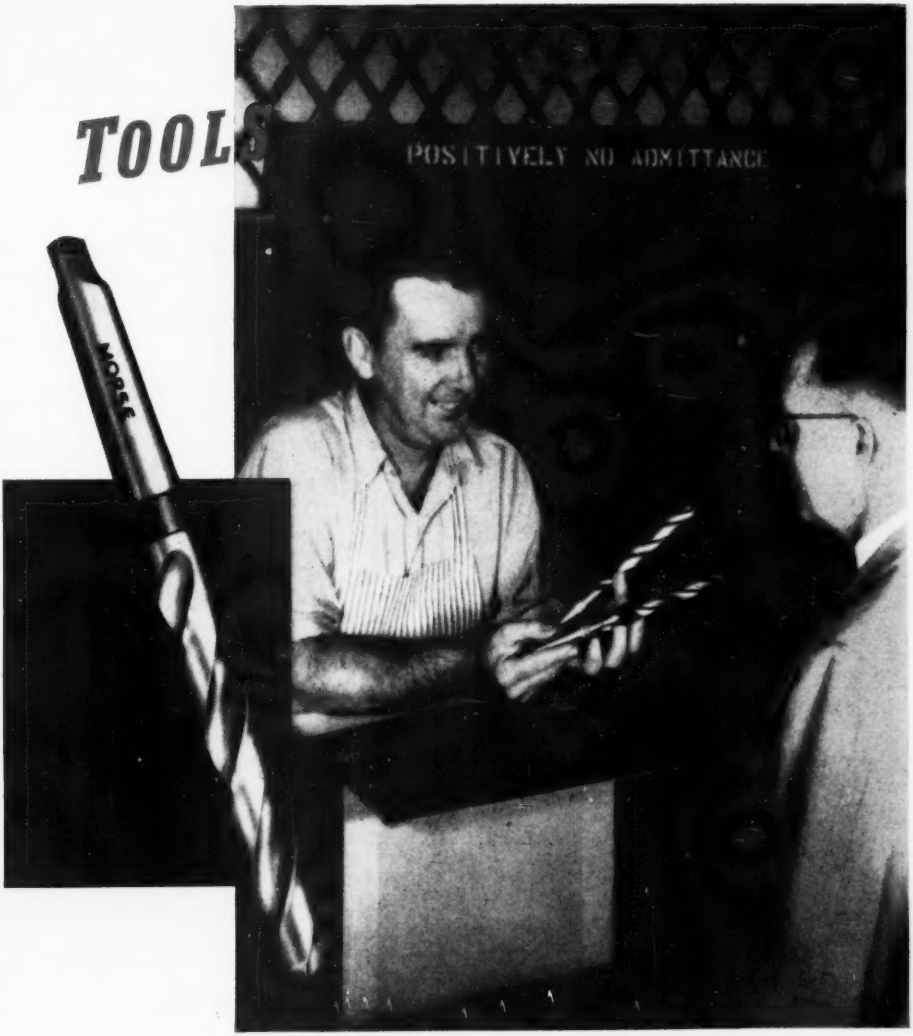
are the least expensive tools you can buy!"

The tool-crib boss never loses a chance to remind the works manager that: "Every new shipment of Morse Cutting Tools that comes into the plant *pays another bonus in plus-production!*"

That's right. For what Morse Tools *really* cut are *costs* . . . by cutting cleaner and faster . . . by staying on the job longer. And then, of course, to go even further and get the unmatched maximum in tool-life, *specify* Morse Electrolized Tools.

Whatever you need, in standard or special-purpose tools contact your Morse-Franchised Distributor. He'll work out the exact specifications that will give you top performance *on your particular job,* at lowest cost. He has the know-how and the assistance of Morse Engineers to solve any tooling problem.

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASS.
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco



MORSE

Cutting Tools

...buy them by phone from your Morse-Franchised Distributor and save ordering time

For... General-Purpose Sawing

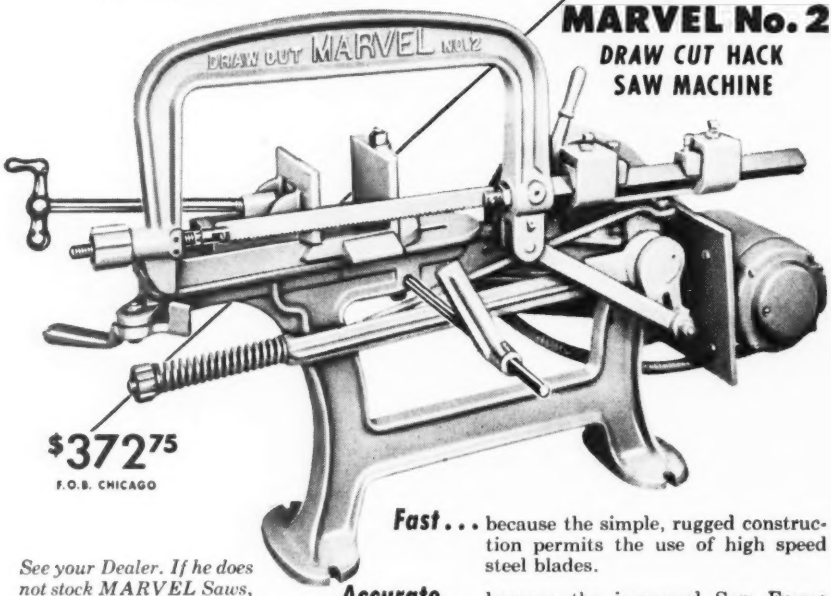
FAST—ACCURATE—ECONOMICAL—DRY CUTTING

Capacity up to 8" round

Improved

MARVEL No. 2

DRAW CUT HACK SAW MACHINE



$372.75

F.O.B. CHICAGO

See your Dealer. If he does not stock MARVEL Saws, he can get them quickly. Or simply write us for literature and delivery. When buying hack saw blades insist that your dealer furnishes genuine MARVEL High-Speed-Edge Hack Saw Blades—they are unbreakable!

Fast... because the simple, rugged construction permits the use of high speed steel blades.

Accurate... because the improved Saw Frame with clamping type blade holders holds the blade in perfect alignment and proper tension.

Economical... because of its automatic relief on the return stroke, the blade will last and last and last.

Dry Cutting... because modern high speed steel blades will operate efficiently at 60 strokes per minute without a coolant.

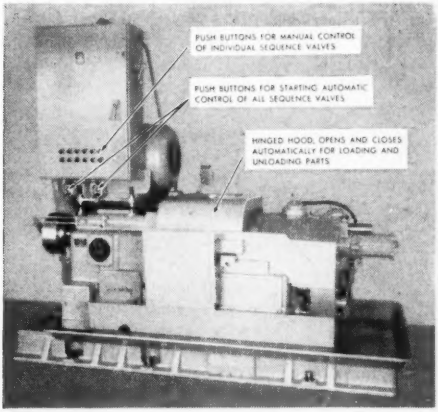
MARVEL *Metal Cutting* **SAWS**

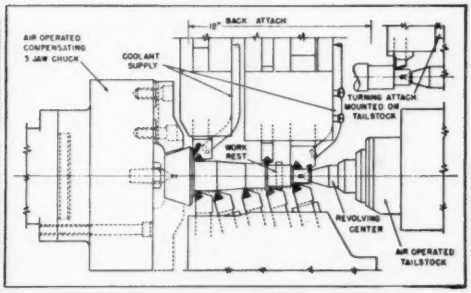
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. · 5700 Bloomingdale Ave. · CHICAGO 39, ILL

MACHINE OF THE MONTH

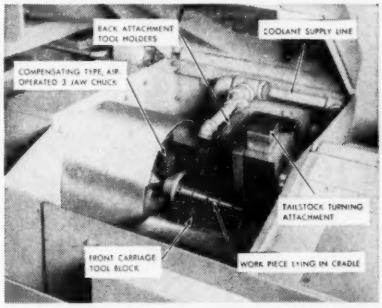
PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK


PUSH BUTTONS FOR MANUAL CONTROL OF INDIVIDUAL SEQUENCE VALVES
PUSH BUTTONS FOR STARTING AUTOMATIC CONTROL OF ALL SEQUENCE VALVES
HINGED HOOD, OPENS AND CLOSES AUTOMATICALLY FOR LOADING AND UNLOADING PARTS



◀ *Tooling area of machine is entirely enclosed, protecting operator from flying chips and coolant.*

▼ *Hinged hood in open position for loading and unloading parts.*


BACK ATTACHMENT TOOL HOLDERS
COOLANT SUPPLY LINE
COMPENSATING TYPE AIR OPERATED 3 JAW CHUCK
TAILSTOCK TURNING ATTACHMENT
FRONT CARRIAGE TOOL BLOCK
WORK PIECE LYING IN CRADLE

Lo-swing LATHE EQUIPPED WITH AUTOMATIC CONTROLS REDUCES HANDLING TIME...

Problem: **To reduce handling time and operator fatigue in machining operations on Axle Pinions.**

Solution: **A Model AR Automatic Lo-swing Lathe, tooled as illustrated, was selected for this job. Work is held on centers and driven with an air-operated, three-jaw compensating chuck. Five carbide front turning tools, two of which are template operated, reduce the length of cut to 1-7/8", which is the length of the taper portion. An additional tool, mounted in a tailstock turning attachment, partially removes surplus material on the threaded diameter in advance of the front turning tool which finish turns this diameter. Six carbide tools on the rear slide face and chamfer the shoulders.**

The machine stops automatically at the end of the cycle with spindle stopped, chuck jaws released, tailstock center retracted, hinged hood open and with the machined part dropped into a cradle. The operator simply replaces the finished part with a rough forging and then pushes the two starting buttons, energizing the loader controls, which consecutively close the hood, places the work between centers, closes the chuck jaws and finally starts the headstock spindle rotation. The automatic cycle from then on is controlled by automatic camming built into the base machine.

The tooling area of the machine is entirely enclosed to protect the operator from flying chips and coolant, while cutting at high spindle speeds. Two starting buttons, wired in series, oblige the operator to use both hands, and are so located that the operator is out of range of the closing hood, thereby preventing accidents.

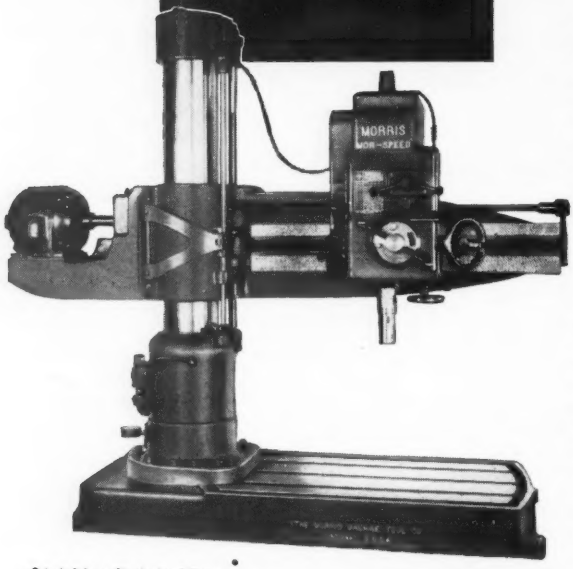
Control buttons on the door of the starter panel permit normal operation of individual controls and are convenient for setting up and timing loader movements.

Seneca Falls engineering staff is at your disposal to help solve your engineering problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

get speed...
safety...
accuracy...
with
MORRIS
MOR-SPEED
RADIAL DRILLS



completely centralized controls...

On a MORRIS Mor-Speed Radial Drill every control is in sight . . . within reach . . . easy to operate fumble free!

The operator makes speed, feed and other adjustments, quickly and easily—concentrates on job, rather than on bending, stepping, stooping or reaching for awkward controls. A wide selection of automatic stops and trips cut time per operation to a minimum. Carefully designed, tested safety devices assure complete protection to machine, operator and work. Alloy steels, modern hardening methods and anti-friction bearings . . . at every wear-vulnerable point . . . plus constant lubrication for all operating parts, protect and maintain precision and make Mor-Speed Radials capable of higher production over longer periods of time.

Find out how MORRIS Mor-Speed Radial Drills can make precision work possible and profitable for you, even under your heaviest scheduling demands.

WRITE FOR BULLETIN NO. 59
Early delivery dates available.

THE MORRIS MACHINE TOOL COMPANY
934 Harriet St. CINCINNATI 3, OHIO

9-inch Column Standard and Heavy Duty models with 3 and 4-foot arms.

11-inch Column Heavy Duty models with 3, 4, 5, and 6-foot arms.

a better product at less cost —with precision PLUS production

Morris

All Hands are "TOP HANDS"

...when they work with SIMONDS "RED END" Hacksaw Blades

It's fast, easy cutting on any material . . . when the hand-frame holds the right "Red End" Blade for the job. That's why those who know, insist on the blade with this famous trade-mark.

On the economy side, Simonds "Red End" Blades are uniformly hardened for better cutting performance and lowest cutting costs. What's more, teeth are accurately milled and precision-set . . . for straighter cutting and longer life. And Simonds offers a choice of three types of blades — Standard, Molybdenum or High Speed Steel — Hard Edge or All Hard — to provide a "right" blade for your job.

Get delivery from stock from your Simonds Distributor.

For PROMPT DELIVERY and PERSONAL SERVICE . . . call your INDUSTRIAL DISTRIBUTOR

SIMONDS SAW AND STEEL CO.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que. Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

MORE DIFFERENT JOBS DONE FASTER, BETTER with KELLERFLEX BURS

Pratt & Whitney precision Kellerflex Burs give more efficiency . . . cut faster, smoother, longer than any other cutting tool of this type. This is why:

CORRECT DESIGN — Rake angle, flute helix, spacing are right for your jobs.

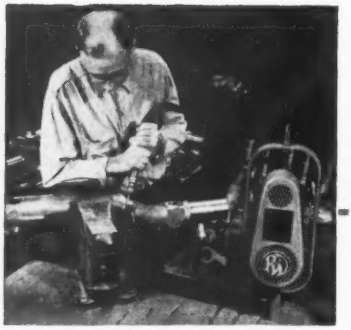
FINE MATERIALS — Correct grade of Carbide and expertly heat-treated High Speed Steel mean keen cutting edges, longer life.

MASTER-GRINDING by MACHINE — From hardened solid blanks, assures concentricity, uniform flute spacing, superior balance. At P&W, "machine-grinding" means "100% by machine".

EXACT DUPLICATES — All P&W Burs of the same size and shape are exactly alike. Order replacements by number and always get identical performance.

USED ON **KELLERFLEX** FLEXIBLE SHAFT MACHINES, you have ample power plus a multiple speed range to obtain the maximum from Kellerflex Burs.

SEND TODAY FOR NEW KELLERFLEX BUR CATALOG and Circ. 521-2 on "Series M" KELLERFLEX MACHINE



PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
25 Charter Oak Blvd., WEST HARTFORD 1, CONN.

Please send: ☐ Kellerflex Bur Cat. ☐ Circ. 521-2

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COMPANY_____

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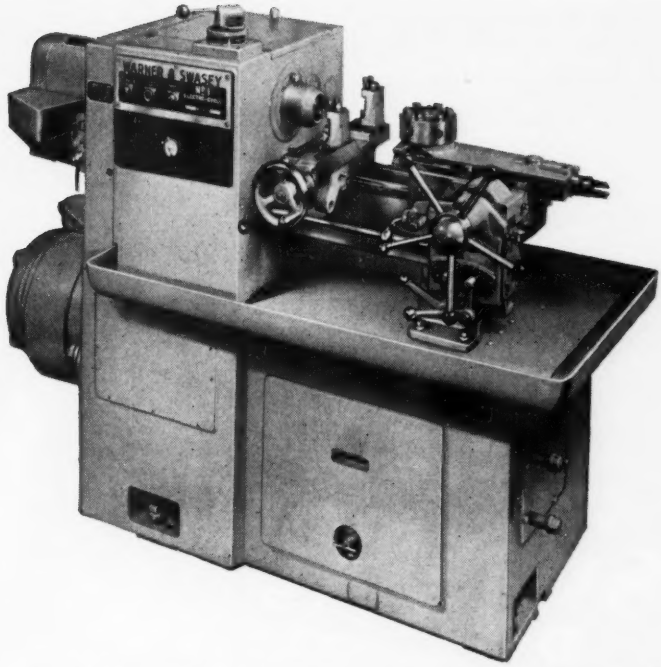

New Warner & Swasey Turret Lathe wins fast acceptance!

SINCE its introduction in 1950, the Warner & Swasey No. 1 E-C has lived up to the reputation for accuracy and dependability already set by its "big brothers" in the Warner & Swasey line. But, let *users* tell you how this new ⅝" capacity machine is performing:

"... a great deal more flexible than previous machines of its size."
"... more rigid."
"... power feed to turret a decided advantage."
"... delighted with its speed range and accuracy."
"... better range of speeds for turning and threading."
"...more efficient on stainless steel."

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

And the reports continue to come in from all types of metalworking plants across the country. Such plants as Dumore Company of Racine, Allmetal Screw Products of New York City, Bahnson Company of Winston-Salem, Wisconsin Motor Corp. of Milwaukee, Kearfott Manufacturing of Newark and many others tell us the 1 E-C is outperforming any small capacity turret lathe they've ever had. You'll find it profitable to investigate the Warner & Swasey No. 1 E-C Turret Lathe, so have your Warner & Swasey Field Engineer show you how it can improve *your* small diameter bar operations.

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

For Fast Local Service Call these Expert Superior Representatives

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- St. Louis, Mo.—Lucas 1233
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- Dayton, Ohio—Hemlock 6209
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Precision Workmanship, Wide Range of Die Set Sizes, Safer, Easier to Handle

Superior precision workmanship, wide range of die sets and exclusive *Safety Flanges, Lock Jaw Lifting Device* and *E. Z. Lift Sling Chain* speed die production from bench to press and eliminate needless risks in handling die sets. Risks that might easily injure the hands of skilled die makers, ruin costly dies in process or completed, or even damage press equipment.

Superior engineers will help determine your needs and can show you how Superior Die Sets have eliminated these handling dangers.

Write for free descriptive catalog No. B-100—that gives you complete details on how you can cut your Die making costs and speed handling.

SUPERIOR STEEL PRODUCTS CORP.
3754 S. 19th ST., MILWAUKEE, WIS.

Sid Tool Company

WHY WAIT FOR SPECIAL TAPS?

. . . Has them IN STOCK for IMMEDIATE DELIVERY!

HIGH SPEED SPECIAL RIGHT HAND TAPS

SIZE	THREAD
4	32-48-60-64
5	30-32-36-48-80
6	36-40-48-56-60
7	32-40
8	24-30-36-38-40-44-48
9	24-28-32-40
10	28-30-36-40-48-64
12	20-28-32-36
14	20-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-40
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-18-20-24-26-27-28-32
13/16	10-14-18-20-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
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1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24
1-5/8	5½-8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4½-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16
2-1/4	4½-8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
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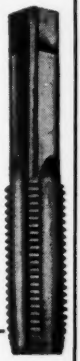
3-7/8	6
4	8-12



HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4½-10-12

- **SPECIAL AND LEFT HAND DIES IN STOCK**

Prices on Application—We are always adding new sizes

NOTE: Oversize—Undersize—Metric—64th—and 32nd Size Taps Available for Quick Delivery.

DEALER INQUIRIES INVITED

• Are you on our monthly mailing list? Write Dept. M.

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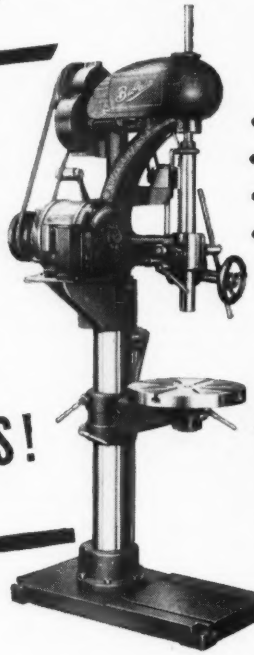
"Buffalo" Tips on Better DRILLING

"Buffalo"

NO. 21 JACK OF ALL TRADES!



For —
- Structural Shops
- Sheet Metal Fabrication
- Maintenance Shops
- Garage & Repair Shops

An Over-All Service Tool!

This rugged 21-inch drill is really a jack-of-all trades for all kinds of job drilling! It's big, husky, well-made. Has direct and back-gearing, eight speeds. Big 27" space between spindle nose and table.

If you're looking for a reliable drilling machine for general work of all kinds—you'll buy the "Buffalo" 21.

Write for prices.

"Buffalo" MACHINE TOOLS

BUFFALO FORGE COMPANY

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DRILLING PUNCHING SHEARING CUTTING BENDING

DIVERSIMATIC

Equipped with the spindle that needs no warm-up!

The machine that's writing new chapters on CENTERLESS GRINDING!

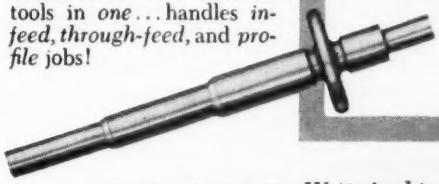
Does *ALL* conventional centerless jobs plus *FORM GRINDING!*

DIVERSIMATIC with CRUSH FORMING is handy as a lathe with a taper attachment! The crush forming attachment does not interfere with any conventional centerless job, but is ready to use when form grinding is required!

DIVERSIMATIC is *three* tools in *one*... handles *in-feed, through-feed,* and *profile* jobs!

HOW WOULD YOU PRODUCE IT?

This example is typical of form grinding possibilities with Diversimatic. All surfaces are ground simultaneously *in a matter of seconds,* with perfect concentricity and to close tolerances!



GET ALL THE FACTS: *Write for big illustrated folder giving Diversimatic details!*

DIVERSIFIED METAL PRODUCTS CO.

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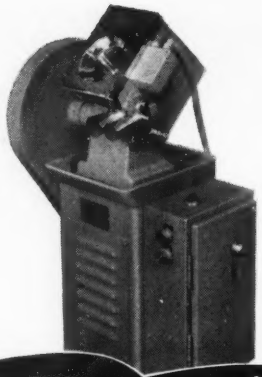
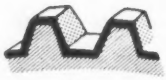
Burrs and Chamfers Spur and Helical Gears and Splines



Model BME-19 BURR-MASTER for helical or spur gears or splines.

This Burr-Master* gives you REAL VERSATILITY in gear and spline chamfering



Note the complete chamfer produced by the Model BME-19 BURR-MASTER.

It is a simple matter to change over the Model BME-19 BURR-MASTER from burring and chamfering a spur gear to a helical or from a gear to a spline.

What is more, the Model BME-19 is amazingly fast, will completely burr and chamfer up to 5 teeth per second. Completely automatic, it does not require skilled operators. Machine never stops. Cycle indicator light tells operator when gear is finished.

There is a BURR-MASTER to fit practically every chamfering requirement regardless of the type of gear or spline.

Ask for Bulletin No 103-45

*Reg. Patents applied for

MODERN
Industrial Engineering Co.
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Introducing...

RODDICK ***self-releasing***

TAP HOLDER

with

BALL-ACTION CLUTCH

Assures:

- **Accuracy**
- **Safety**
- **Minimum wear**
- **No hammering of clutch**

Taps can be changed in a few seconds, in two operations—
no bushings required
Right or left hand tapping
Can be used on rotating or non-rotating positions
Floats tap into hole
3/32" length of pull-out to release
Uniform depth of thread regardless of feed
Solid shanks for strength
Floating back jaws compensate for off-center tap squares
Threading operation can stop and start at any point
without difficulty or shock

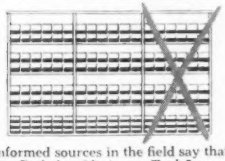
Send for leaflet giving more detailed information about this incomparable tool which incorporates a revolutionary principle that will speed production and produce better work.

8776 GRINNELL AVE. **EMPIRE TOOL COMPANY** **DETROIT 13, MICHIGAN**

NEWS ABOUT CREATED-METALS

Are Industry Inventories too High?

Business Week recently stated, "Don't underestimate the inventory problem. If a recession starts anytime in 1953, stocks of goods are likely to be at the bottom of it." *Iron Age* pointed out that, "hottest subject in automotive circles today is reducing tooling costs and shortening the tooling time cycle."



Informed sources in the field say that the Carboloy Minimum Tool Inventory Plan (described on these pages) is a forward step in answer to these problems as far as cutting tools are concerned

* * *

Woodcutting Saws to Get New Teeth

The Carboloy organization has recently standardized production on 20 solid tungsten carbide tips for circular woodcutting saws. Saws with these carbide tips will soon be available from a number of saw manufacturers and offer phenomenal production increases over steel blades. Tool manufacturers can obtain details and prices by writing for Bulletin W.W.-53-1, Carboloy Department of General Electric Company (address at right).

* * *

Communications Given Boost by Magnets

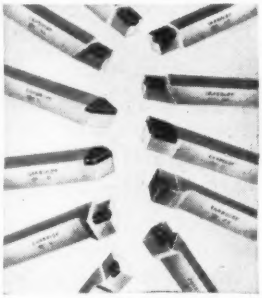
Because they help eliminate costly, bulky coils, Carboloy permanent magnets are being used more and more in communications equipment. The list includes loudspeakers for shops, radio, TV other electrical components in telephones, transmitters, phonographs, hearing aids, etc.

These are the same Carboloy permanent magnets shop men find so useful for separating sheet steel, retrieving tools, holding jigs and doing other handy, timesaving jobs.

YOUR CARBOLOY SALES REPRESENTATIVE SAYS . . .

"Let us show you how up to 1/3

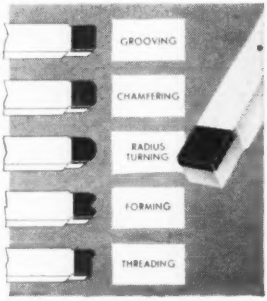
"OUR Minimum Tool Inventory Plan is the answer. It's an easy-to-adopt plan *that works!* Under it, you stock a basic number of low-cost Standard Carboloy Tools in place of many costly "specials." The proposal shows you how to adapt these Standards to almost any single-point tooling job . . simply and quickly. You use your regular carbide equipment. You'll cut down production delays. You'll reduce your inventories *30% or more.* Read about it on these pages . . . "



1 What are Standard Carboloy Tools?

They are high-quality carbide-tipped single-point tools for turning, boring, facing and other machining operations. They outlast high-speed steel tools as much as 10 to 1 will operate at machine speeds up to 4 or 5 times faster than ordinary tools.

There are only 11 styles of Carboloy Standards. They can be used "as is," or ground – in minutes – to do up to 80% of your single-point tool machining jobs. Carboloy Standards are as near as your phone, too. They are stocked in your area by Authorized Carboloy Distributors.

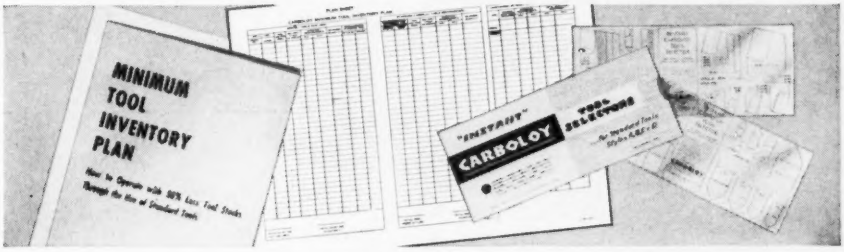


2 Here's how they adapt to your jobs.

At left is a style C Standard Carboloy Tool – one of the 11 styles. Note the generous-sized carbide tip. It can be used "as is" for some jobs . . . or adapted to meet any number of your special tooling requirements (as the 5 typical, adapted shapes at left, for example).

Carboloy Standards can be ground quickly in your own tool room, using an ordinary silicon carbide wheel for the rough grind, a diamond wheel only for sharpening. With a minimum stock of Standards on your shelves, you'll be able to get up to 80% of your single-point machining jobs rolling in a hurry.

to reduce your single-point tool stocks . . . with Standard Carboloy Tools!"



3 **Here's why the Minimum Tool Inventory Plan (MTIP) will work for you.**

The Carboloy MTIP includes all the helps you'll need to standardize your single-point machining jobs with Carboloy Standard Tools. Send for the free MTIP kit. When it arrives: (1) Review your special single-point blueprints, using the handy plastic Instant Tool Selectors (above) to choose in seconds the right Carboloy Standard Tool to adapt for each job. (2) Enter the findings on the Plan Sheet (above, center), filling in the ". . Tools Recommended" section. *That's all there is to it!* Now you can quickly compute what Standards you'll need, how many to stock, how much they'll cost. You'll see at a glance how the MTIP reduces your inventories up to one-third or more . . lowers initial tool investment, shortens delivery cycles . . . gives you other benefits shopwide.

4 **A Carboloy Sales Representative or Distributor will make sure it works.**

Before you adopt this plan you can, if you wish, have a carbide expert from the Carboloy factory, district office or nearby Carboloy distributor come to your plant . . help you get the MTIP rolling. He knows what carbide grades to recommend for particular jobs. He'll show you how Standard Carboloy Tools can pay for themselves in increased production and downtime savings alone. His services cost you nothing.

Carboloy Tools Are Stocked Coast To Coast By

AUTHORIZED CARBOLOY CEMENTED CARBIDE DISTRIBUTORS

Look under "Tools" in the Yellow Pages of your local telephone book, or in Thomas' Register, for your nearby Carboloy distributor. He has complete local stocks and can give you complete carbide service.

"Carboloy" is the registered trademark of the Carboloy Department of General Electric Company

GET ALL THE FACTS. MAIL COUPON TODAY!

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11143 E. 8 Mile Blvd., Detroit 32, Michigan

☐ Please rush me, at no cost or obligation, full details on your Minimum Tool Inventory Plan.

☐ Have your representative call, without obligation.

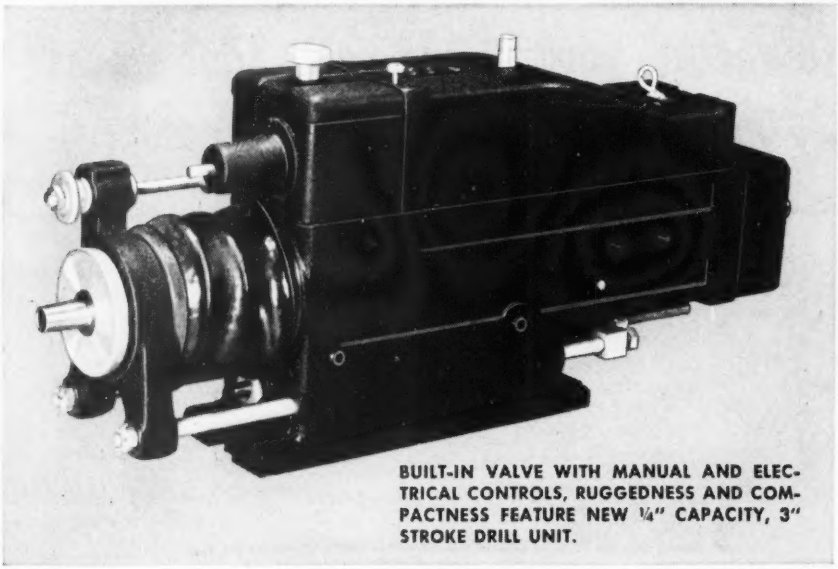
Name _____ Position _____

Company _____

Address _____

City _____ Zone _____ State _____

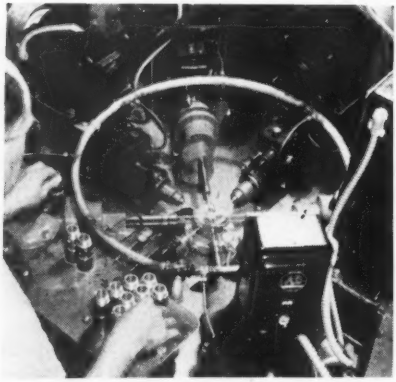
BELLOWS-LOCKE DRILL UNIT COMBINES HYDRAULIC FEED, AIR-POWERED TRAVERSE, ELECTRICALLY DRIVEN SPINDLE



BUILT-IN VALVE WITH MANUAL AND ELECTRICAL CONTROLS, RUGGEDNESS AND COMPACTNESS FEATURE NEW ¼" CAPACITY, 3" STROKE DRILL UNIT.

PRECISION adjustable hydraulic controlled feed rate, coupled with rapid air-powered advance and retract, and a full 3" drilling stroke, make the Bellows-Locke Drill Unit an important component in tool-room-built special purpose machines. Feed rate is infinitely adjustable from 0" per minute up to the maximum speed of the air-powered movement as determined by the air line pressure used.

The Bellows-Locke Drill Unit can be mounted horizontally, vertically, or at any angle. Its small size (21-1/16" long by 3¼" wide by 7-11/16" high) lends itself to space saving design. Used with a 1750 RPM motor, spindle speed range is adjustable from 690 to 4630 RPM through the Bellows Speed-Selector Pulley. (Motor and Speed Selector Pulley are optional.)



This special purpose machine at The Perry-Fay Co., Elyria, Ohio, uses 8 Bellows-Locke Drill Units to drill twelve 7/32" holes in less than 1-1/2 seconds.

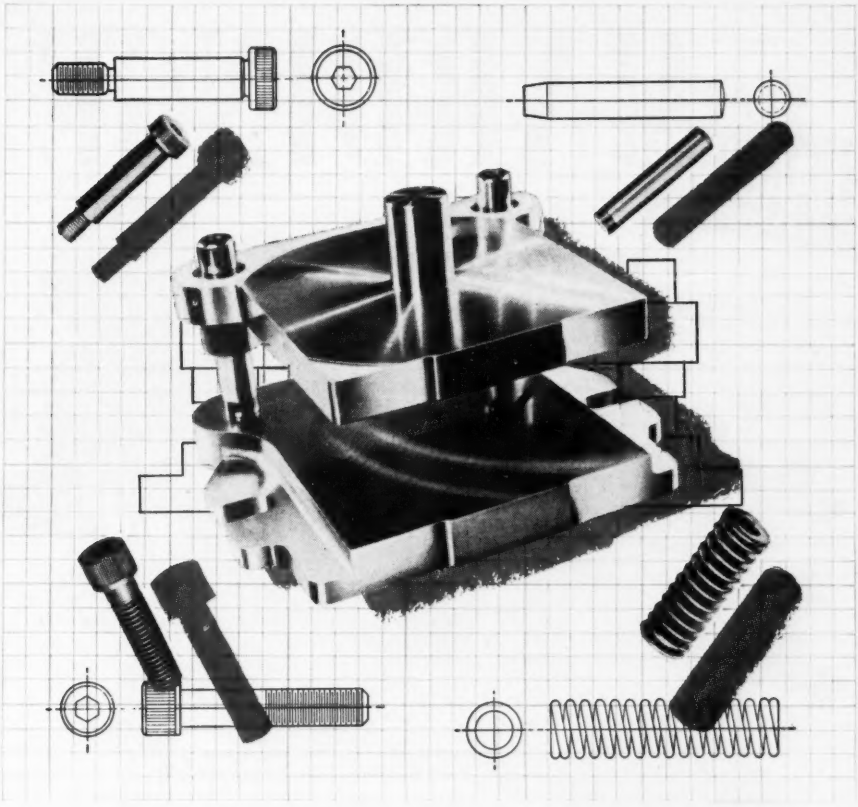
As standard, the unit is equipped with built-in directional air valve with built-in solenoid, as well as manual start and stop controls. It is available with optional electric controls to provide deep hole drilling with automatic drill cleaning, or time controlled dwell. The Bellows-Locke Drill Unit can be factory equipped with any standard tapping head.

The Bellows Co.
ESTABLISHED 1911

AKRON, OHIO

See your local Bellows Field Engineer or write direct for a copy of the Bellows-Locke Bulletin. Address Dept. MMS-553, The Bellows Co., Akron, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., 4972 Dundas St. W., Toronto 18, Ontario.

695-A



THERE'S A DANLY STANDARD TO MEET YOUR DIEMAKING SPECIFICATIONS

In nearly every instance, Danly can meet your diemaking specifications with *standard* Danly Die Sets and *standard* Danly Diemakers' Supplies. Eliminate delay between design and production . . . you can be sure of prompt delivery from completely stocked Danly branch assembly plants located in major toolmaking centers.

More than 30 years' experience in supplying diemakers' needs has established Danly's reputation for design excellence and dependable accuracy. Diemakers everywhere *prefer* Danly!

Plan now for faster tooling *and* longer production runs at less cost . . . with Danly Die Sets and Danly Diemakers' Supplies.

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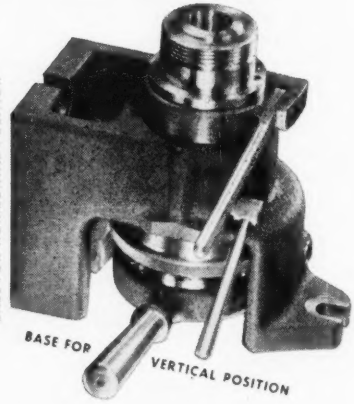
HARDINGE
ELMIRA, N.Y.

COLLET INDEX FIXTURES

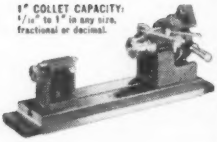
Speed Production and Hold Work Accurately

This fixture will take both step chucks and jaw chucks in addition to standard collets; your tool room will not have to make special fixtures.

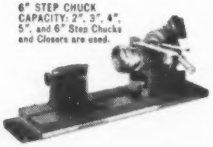
A Preselector Index Plate makes possible the separate indexing of any number divisible into 20 or 24. Quick opening and closing of collets and step chuck, with 100 to 1 closer lever.



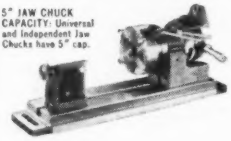
1" COLLET CAPACITY: 1/16" to 1" in any size, fractional or decimal.



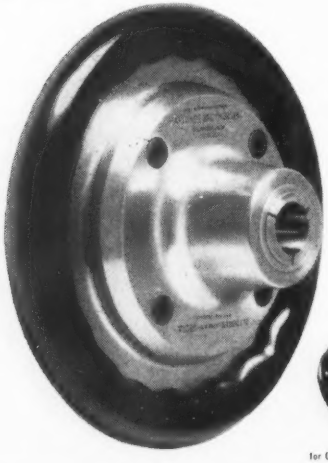
6" STEP CHUCK CAPACITY: 2", 3", 4", 5", and 6" Step Chucks and Closers are used.



5" JAW CHUCK CAPACITY: Universal and Independent Jaw Chucks have 5" cap.



For full information write for Bulletin CIF.



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SPEED COLLET CHUCKS—*Fast and Accurate*

The Hardinge-Sjogren Speed Collet Chuck gives greater capacity, saves time, insures accuracy and better results. It is readily adapted for use on all tool room and engine lathes. Keys and wrenches eliminated . . . a turn of the handwheel automatically opens or closes the collet, releasing or locking the work as desired. Its grip is adjustable and sure. No waste motion . . . the operator is always in front of his work, production increased.

Available in 1", 1⅜", 2¼", 3½" collet capacity. Write for Bulletin 8.

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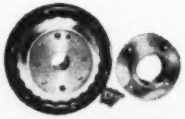


for THREADED NOSE SPINDLES

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

EASIEST OF ALL SHEARS TO OPERATE

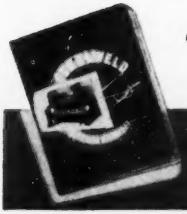
"EASIEST of all Shears to operate" are not just our words. They are words of operators being heard with increasing frequency as more Steelweld Shears are placed in plants throughout the country.

Men who have worked for many years on shears of various makes and know them through and through are acclaiming the many features incorporated into Steelwelds — features that ease their work, speed production and make for greater accuracy and minimum maintenance.

Steelweld Shears are entirely new machines designed from scratch as such. They are not a variation of or an adaptation to any previously existing machine. The designers of these new shears were free to incorporate all ideas and features that would result in better machines. They were not hampered by tradition or previous designs or models.

As a result Steelweld Shears are radically different with advantages never before possible.

Whether or not you are in need of a shear at this time, if you work plate in any thickness up to 1¼-inch or length to 20 feet, we urge you to get more data on these modern machines. Keep informed — send for the catalog below.



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STEELWELD PIVOTED BLADE SHEARS

AMES

No. 2 Dial Comparator

This is smallest in the Ames' line of high quality dial comparators. It is ideal for desk or bench use in the fine inspection of small precision parts. Light in weight, its broad base makes it very stable. The capacity approximates that of the regularly supplied Ames No. 202 Dial Indicator which has a 0-100 dial, graduated in .001", with a .250" range. If your job requirements differ, you can have the No. 2 with any Ames "Hundred Series" Dial Indicator. Send for details.

Ames Long Range Dial Indicator No. 2822

Ames Dial Comparator No. 130

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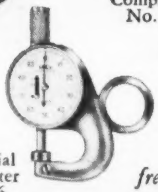
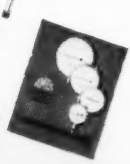


Ames Dial Micrometer No. 516



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Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

This machine will never be an ORPHAN!

Your REID *grinder* will always have a home . . . a home you can depend on for replacement parts, service assistance or operating advice.

REID has built an enviable reputation for integrity in sales upon this fact. It has been the foundation of over fifty years of successful machine tool building.

Whenever you need replacement parts, you can be sure that shipment will be made, usually within 24 hours of receipt of your order, by the fastest available transportation. And our technical service specialists are always available to help solve *your* problems.

A phone call, telegram or letter will bring assistance — but for fastest results, make sure that you have the proper parts list and operating book for easier ordering. If you can't locate yours, a request on your letterhead, with model and serial number from your machine, will bring you a copy.

Simply write to Dept. 12

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PEDRICK PRODUCTION BENDERS are in use throughout the world. They save time and money bending pipes, tubes, reinforcing bars, angles and many other structural shapes. Why not increase your bending production and reduce your costs with semi-automatic bending? Ideal for job or production work.

Available in 9 power models, starting at

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PYLE NATIONAL INCREASES PRODUCTION 47%!

Soldering Of Spring Assemblies Speeded By *LINDBERG* Induction Heating Unit

An hourly production increase of 47% . . and a per-operator production increase of 330% through the use of a Lindberg Induction Heating Unit! These are the money saving facts and figures reported by Pyle National Co., Chicago manufacturer of electrical components.

The company uses a 10 KW Lindberg unit for the production soldering of flanges to coil springs in the manufacture of torsion spring assemblies. The time cycle is 11 seconds for each assembly.

Production has been increased to 125 assemblies an hour . . with one girl operating the equipment. This is an hourly increase of 40 assemblies over the former method where soldering was done by a team of three men using gas torches. And the hourly per-operator production is up from 28 to 125!

With the induction heating unit, there are no open flames from gas torches. No extra exhaust fans are required . . there is little danger of burns to operators . . fire hazards are virtually eliminated!

And there is a substantial economy of floor space! Formerly the three torch operators required more than 60 square feet of floor space . . but the Lindberg Induction Heating Unit requires less than 30 square feet.

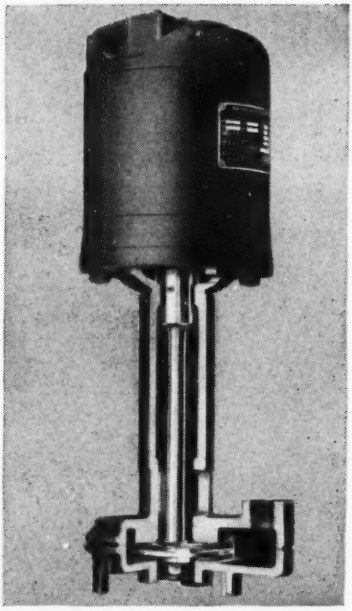
If your requirements call for production soldering, brazing, hardening, annealing, stress relieving, hot forming, forging or shrink fitting, investigate Lindberg Induction Heating Units. Ask for Bulletin 1440.

These parts . .
plus this ring of soft solder . .
go through the
Lindberg Induction Heating Unit
to make this
torsion spring assembly . .

LINDBERG

HIGH FREQUENCY DIVISION
LINDBERG ENGINEERING COMPANY,
2450 West Hubbard Street, Chicago 12, Illinois

Motor-Driven Centrifugal Pumps That Dirt Can't Hurt!



Here's a complete line of ten different Motor-Driven Centrifugal Pumps that are completely protected from damage by dirt or abrasives. Hydraulically balanced, their design provides stability without using a bearing at impeller end of shaft . . . eliminates metal-to-metal contact below water level. All motors are of standard NEMA design, for easy replacement, and totally enclosed against dust or vapor . . . no lubrication or maintenance required.

The design simplicity and sound construction of these Brown & Sharpe Pumps makes them ideal for applications where grit or foreign substances may be present. Write for Pump Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

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Saves You Time and Money . . .

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. . . over 250 standard sizes in 18" and 36" lengths from 1/64" to 2" thick, from 3/16" to 14" wide. Special sizes of almost any dimension. Special accuracies to .0005". To save machining time and tool steel waste, specify DoALL.

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. . . from electric furnace to packaged piece, DoALL Ground Flat Stock is tested and examined to assure you accuracy, uniformity, outstanding surface finish. For easy machining, uniform heat treating, freedom from trouble and loss, it's DoALL.

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. . . 38 local DoALL Sales-Service Stores carry large stocks of DoALL Flat Stock. Special sizes and tolerances not carried in stock can be made up and shipped on remarkably short notice.

Ask for DoALL Oil Hardening Flat Stock size chart and bulletin. Ask to see DoALL Tool Steel at your plant. Call your local DoALL Store, or write:

The DoALL Company, Des Plaines, Ill.

DoALL

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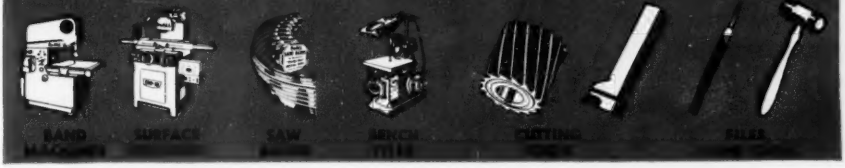
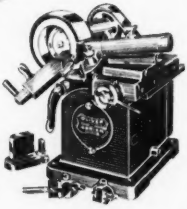


At The First Sign of Dullness Sharpen Your Drills With

OLIVER DRILL POINTERS



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Machine Grinding Is Best For Drill Sharpening. It's More Accurate • More Reliable — Do It The Oliver Way

Your Drills Will

- cut faster
- last longer
- produce more accurate holes

It is important to remove twist drills from the drilling machine and replace them at the first sign of dullness. Better yet, allow them a certain number of hours production or a certain number of parts produced—then *play safe* • protect your production run • sharpen them correctly on an Oliver Drill Pointer. Oliver Drill Pointers give balanced cut, with each lip doing equal work, eliminating the excessive drill costs and imperfect holes usually traced to improper drill grinding.

No. 510 for drills ¼" to 3"—2-3-4 flute. Variable clearances. Variable point angles. Full automatic operation.

No. 21 Oliver Bench Grinder. Hand operated for Drills No. 57 to ½". Right hand, with an improved point. Attachments are available for grinding oil hole drills, left hand and other special points.

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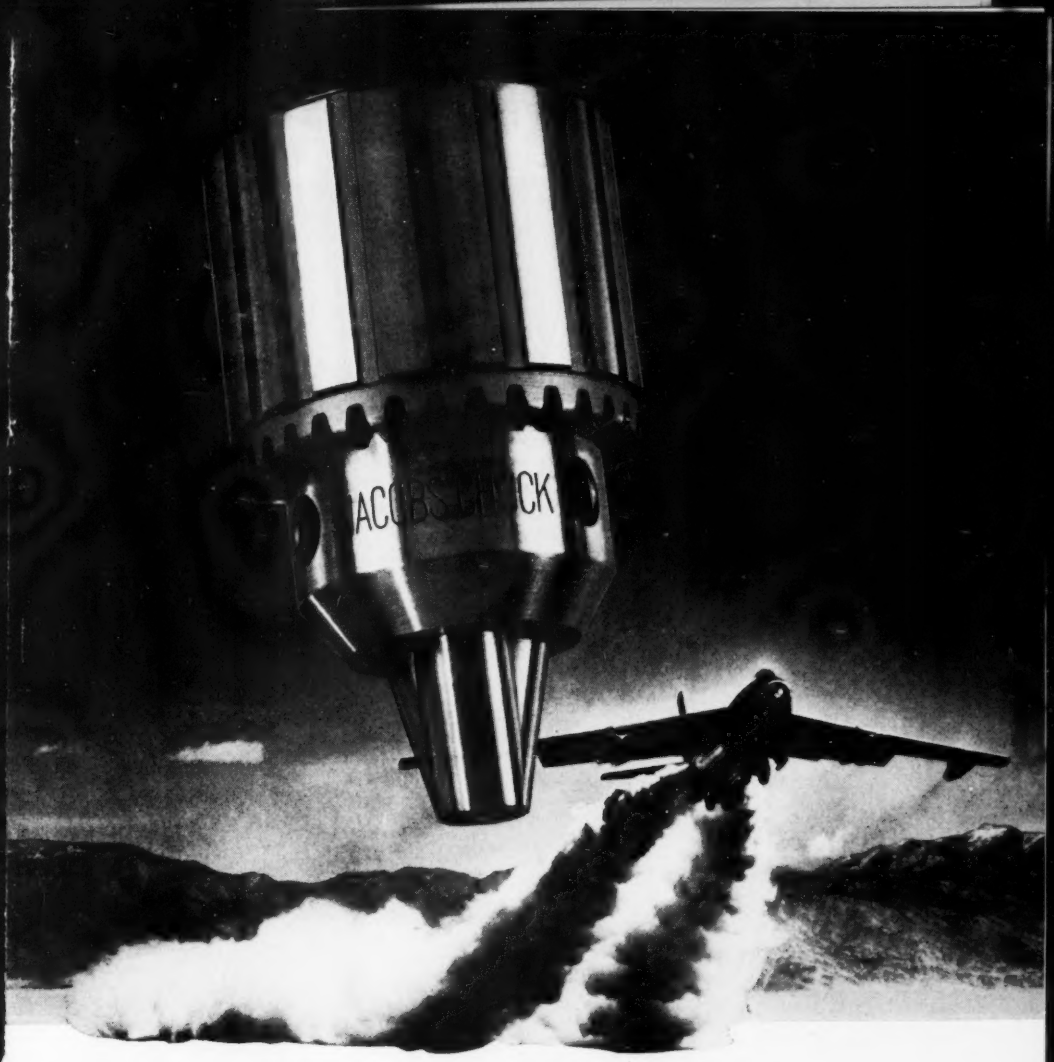
1430 E. MAUMEE • ADRIAN, MICHIGAN



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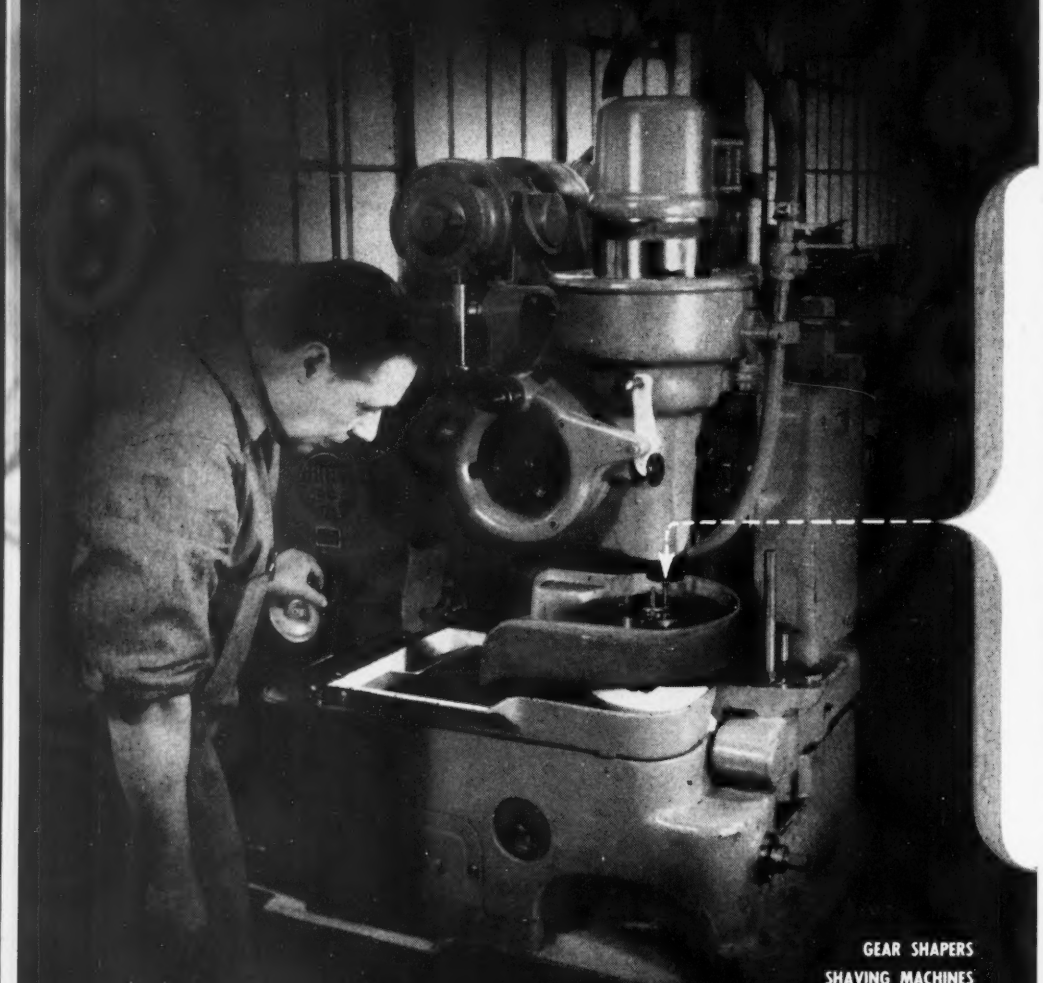
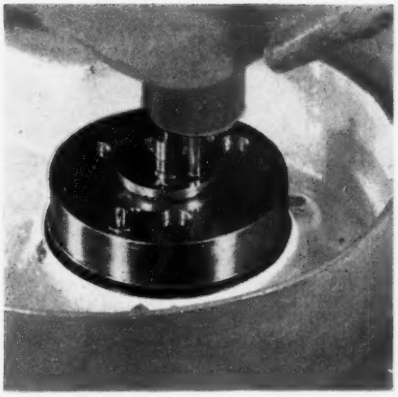


GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

Cutters . . .

CONTROL INSTRUMENT COMPANY KEEPS REJECTS "well under 1%"



PRODUCTION DATA

Number of Teeth (Cutter) (Limited by projecting hub)	18
Number of Teeth (Gear)	96
Pitch	48
Pressure Angle	20°
Pitch Diameter	2.000 (+.002; −.000)
Run Out (Total Indicator Reading)	.001
Number of Cuts	2
Production Time (2 Cuts)	90 minutes
Blank Material	4140 Chrome Moly Steel

Control Instrument Company of Brooklyn, New York, uses a Fellows 7-Type Gear Shaper to cut this 2.000" pitch diameter internal gear for a military fire-control device.

Using original Fellows cutters for both rough and finish cuts of this 4140 Chrome Moly steel, the number of rejects is exceedingly small. Control Instrument Company says, "...using Fellows cutters, our rejects are well under 1%."

The versatile Fellows 7-Type is the most widely used size in Fellows' complete line of Gear Shapers which generate gears from 1/16" to 120" diameter. It offers precision and high production on external gears up to 7" diameter, 1½" face and on internal gears up to 5½" diameter, 1" face. Set-up is simple, and changeover on production runs is quick.

For helpful information on cutting coarse or fine pitch gears, cams, ratchet teeth, interrupted profiles, segment gears, face gears, racks, and other unusual, high quality gears—just write, wire or 'phone the Fellows office nearest you.

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There's a WALKER-TURNER

LIGHT-HEAVYWEIGHTS

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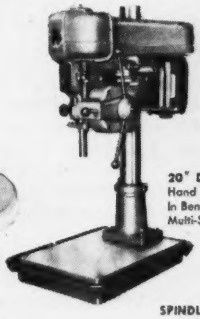
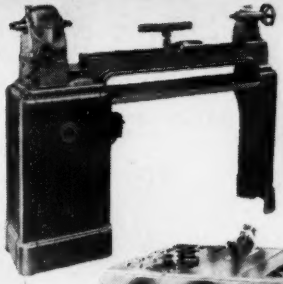
designed to do the job faster, at lower investment cost

15" DRILL PRESSES
6" or 4" Spindle Travel
In Bench, Floor (shown) and Multi-Spindle Models

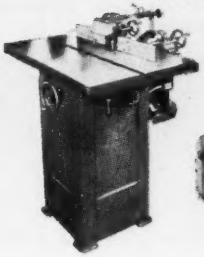


20" DRILL PRESSES
Hand or Power Feed
In Bench (shown) Floor and Multi-Spindle Models

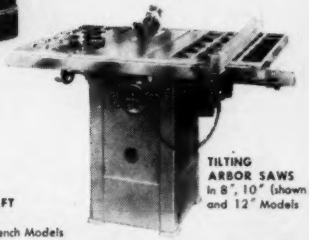


VARIABLE SPEED LATHES

RADIAL DRILLS

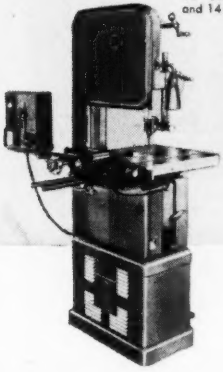


SPINDLE SHAPERS 1 h.p.

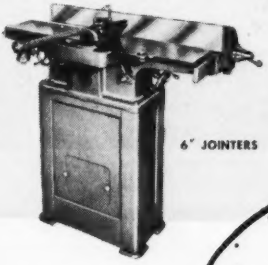


TILTING ARBOR SAWS
In 8", 10" (shown) and 12" Models

FLEXIBLE SHAFT MACHINES
In Floor and Bench Models



BAND SAWS
Metal and wood-cutting
16" (shown)
and 14" Models



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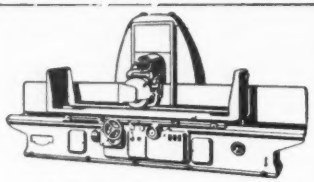
There's a Mattison to Grind it.

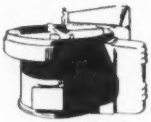
● With the addition of the production grinding machinery formerly made by the Hanchett Manufacturing Company, Mattison now is in a position to work with you on all your surface, face and disc grinding problems. These machines are made in various types to handle a wide range of work. Experienced fixture engineers are available to give you best production efficiency with Mattison Machines.

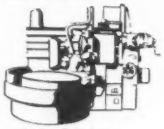
For any flat grinding, ask for our recommendations on the proper method and machine for your job. No obligation, of course.

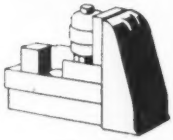
For catalog on all machines, ask for free copy of general bulletin.

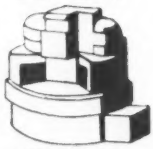

Precision Surface Grinders Horizontal Spindle

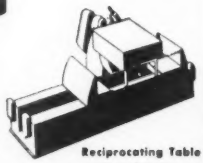
Disc Grinders, Double Spindle Type


Vertical Spindle Disc Grinders

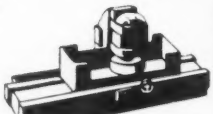

Plano Grinders, Rotary Table Type


Rotary Table Surface Grinders

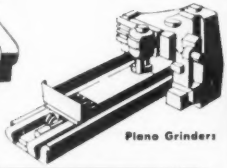

Automatic Rotary Surface Grinders

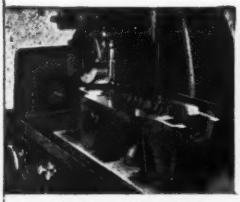

Reciprocating Table Face Grinders

Disc Grinders, Single Spindle Type

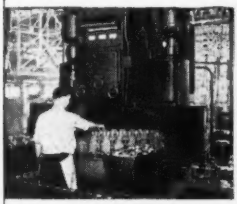

Reciprocating Table Surface Grinders Vertical Spindle

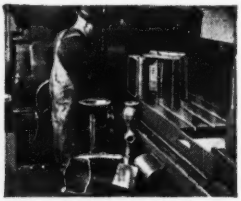
Face Grinders, Traveling Wheel


Plano Grinders


40 hours before — now 4 hours. Pump case ground on Mattison Horizontal Spindle Precision Surface Grinder

320 surfaces of cast iron compression heads per hour, removing 1.32" stock with Mattison No. 24 Rotary Surface Grinder


900 connecting rods per hour, using 40 station fixture to finish grind crank and wrist pin end of assembled rod with Mattison No. 72 Grinder


Shows variety of work run on Mattison Face Grinders

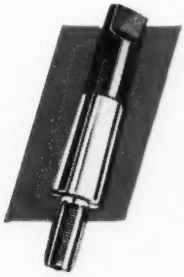
MATTISON MACHINE WORKS
ROCKFORD • ILLINOIS

SPEED PRODUCTION ... and CUT COSTS!

Use SJ **SCULLY-JONES**
DRILL and TAP CHUCKS

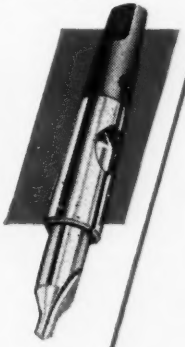
Save costly set-up and down-time: *No moving parts to get out of order. Simple one-piece design. Easy to insert or eject. Broached square provides positive drive... eliminates slipping and tool damage. Collet action automatically centers tool. Ideal for close center and multiple spindle work.*

Reduce tool replacement: *Carefully hardened to resist nicking and burring, which often cause misalignment and tool damage. Bore and shank machined concentrically to assure true-running tools and reduce rejects. Built to withstand modern production methods and outlast many drills or taps.*



"STYLE A"
SCULLY-JONES TAP CHUCKS
Save costly "Set-Up" and "Down-Time". Drive tap by the square — center by the shank — hold with a collet action.

"STYLE B"
SCULLY-JONES DRILL CHUCKS
For driving straight shank drills. Make possible 25% or more saving. Easy to use. Positive drive; no slipping. Accurate drilling.



"STYLE B"— SCULLY-JONES CENTER DRILL DRIVERS
For driving combined center drills and countersinks — regular and bell styles. Simple one-piece tools.

Send for
Bulletin No. 1-50
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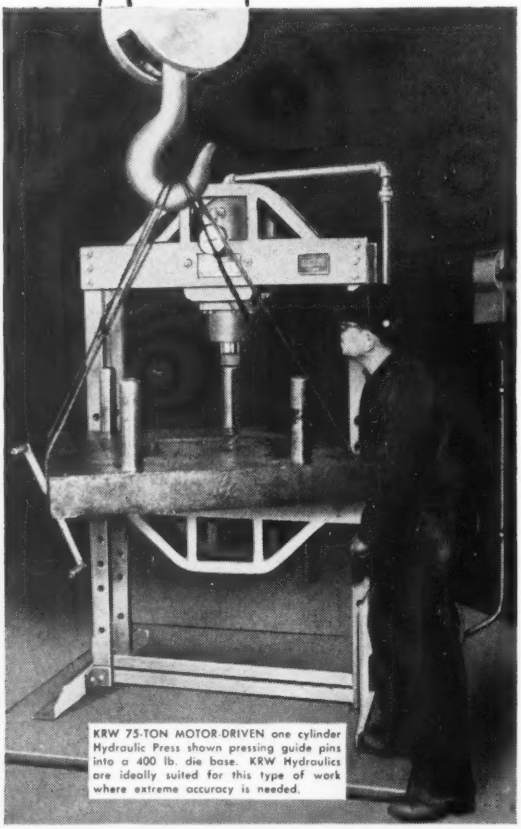
KRW PRESS

Does its daily dozen

. . . and big ones like this are just routine!



KRW 75-TON MOTOR-DRIVEN one cylinder Hydraulic Press shown pressing guide pins into a 400 lb. die base. KRW Hydraulics are ideally suited for this type of work where extreme accuracy is needed.

That's a 400 pound die base in the KRW Hydraulic Press at left. Offhand you might think that it's biting off more than it can chew. But not this press! It's been doing a dozen jobs like this **daily** for two years.

The Press is used in the Specialty Shop of a large steel company which makes everything from ornamental iron railings to end "spiders" for lawn mowers. It does a wide variety of jobs such as pressing pins in bearings, straightening bent roll shafts, pressing die shanks into punch holders and compressing springs on die strippers before dismantling dies — an important safety feature in this Shop.

LOOK AROUND YOUR SHOP!

You'll probably find several jobs that could be done faster, more easily with a KRW Hydraulic. They're amazingly versatile and their cost is surprisingly low. 25-150 ton capacities; one, two and three cylinder models; hand operated, air operated or motor driven. If you need a special Press we'll design and build it for you.

Write Dep't. 16 for specifications and prices

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Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!

master
MACHINE TOOL ATTACHMENTS

for
LATHES
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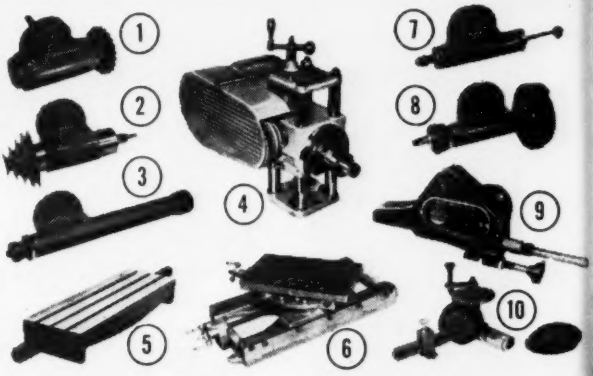
OR USE INDEPENDENTLY



1. 90° Universal Milling Head
2. Hi-Speed Milling and Drilling Head
3. Deep-Hole Internal Grinder Head
4. Basic Milling Unit
5. Milling and Grinding Table
6. Universal Feed Table
7. Internal Grinder Head
8. External Grinder Head
9. Slotting and Keyseating Head
10. Geared Dividing Head

MASTER MACHINE TOOLS

★ ★

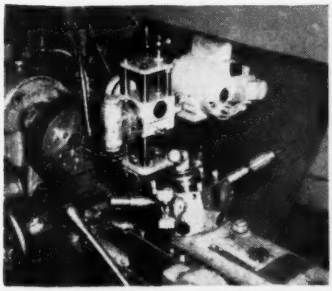
THREE SIZES

MODEL "C," ½ hp — 9" TO 13" LATHES
MODEL "B," ½ OR ¾ hp — 13" TO 18" LATHES
MODEL "M," 1 OR 1½ hp — 18" TO 72" LATHES

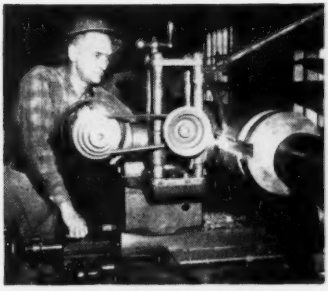
★ ★

The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, boring, drilling, indexing, slotting, and keyseating, internal and external. Its full complement of equipment is an outstanding value for maintenance, repair, tool room, and experimental shops, as well as production, thus performs a full range of shop operations at a minimum investment. These improved models are outstanding in rigidity, capacity, and simplicity of set-up and operation and incorporate the latest features developed in our 17 years of manufacturing this tool. Investigate this valuable shop tool. For the cost of one single-purpose machine, you can have several Master units producing. Prompt deliveries.

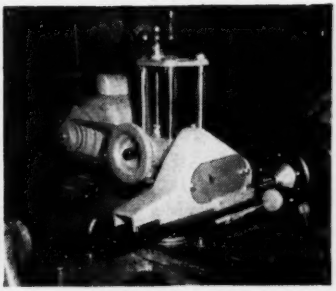
MAKES LOW-COST INDEPENDENT PRODUCTION SET-UPS — PORTABLE — SELF-POWERED



Milling on turret lathe completing part in one set-up



End Milling 2½" keyway in 9⅞" diameter shaft 22 ft. long



Master Slotting Head on lathe cutting internal taper keyway

FREE

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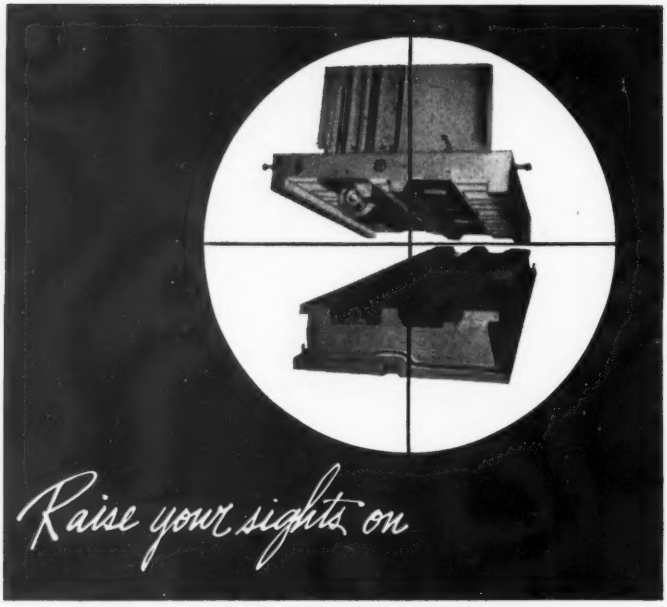
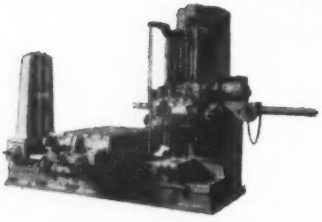


boring mill life and accuracy



Cincinnati Gilbert boring mill columns ride on non-metallic way blocks that virtually eliminate scoring, sticking, or wear on the bed ways! The non-metallic material contains thousands of oil-bearing fibers *at right angles to the face of the blocks* which maintain effective lubrication even under the most severe conditions. The records prove it. Gilbert accuracy is also sustained by the use of narrow guides throughout. The head has plenty of heft and a minimum of moving elements in the transmission . . . On your next horizontal boring mill purchase, *aim high on performance:* specify Cincinnati Gilbert, equipped with Gilbert non-metallic way blocks.

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MACHINE TOOL COMPANY
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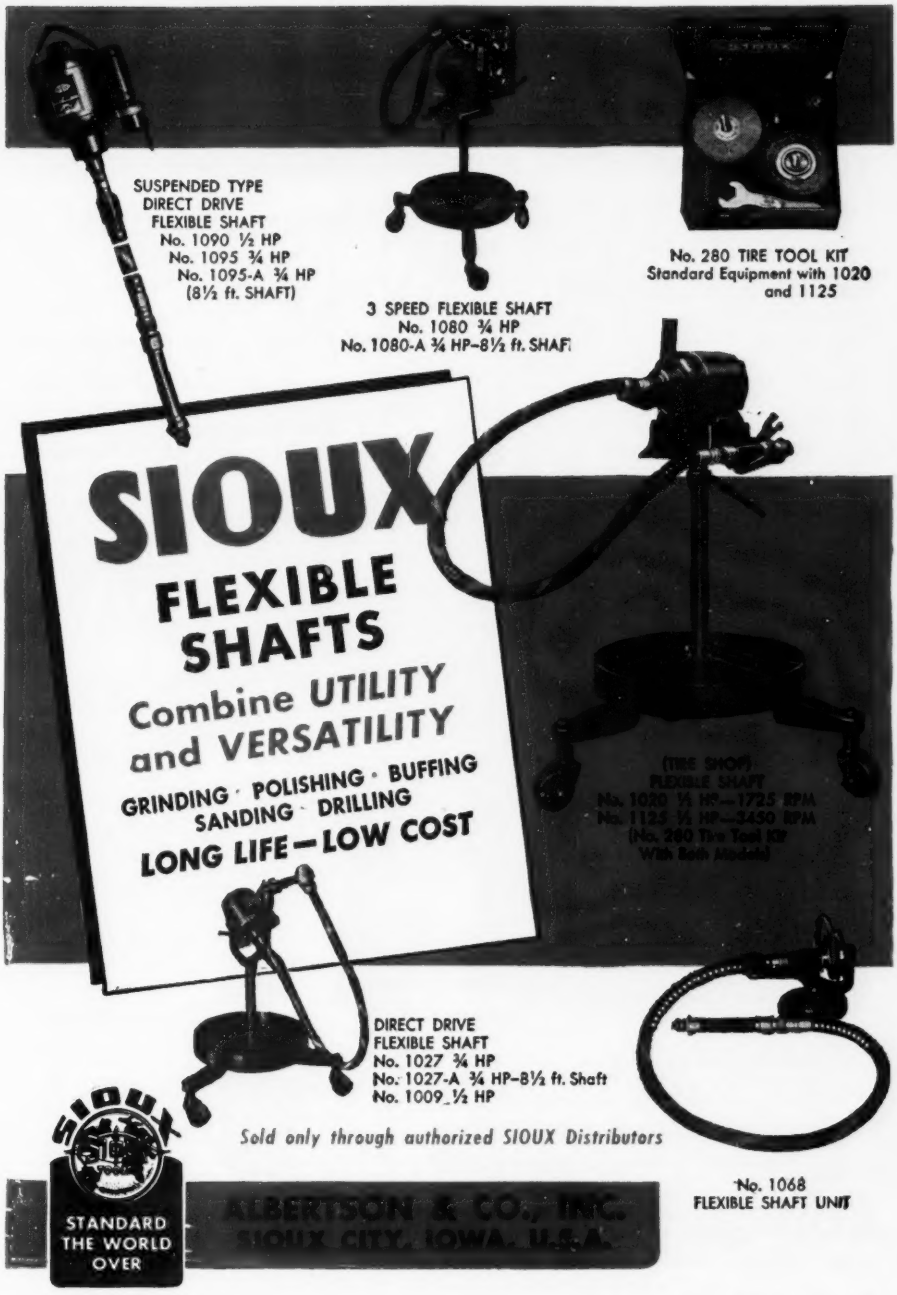
those who buy Gilbert buy Gilbert again


SUSPENDED TYPE
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(8½ ft. SHAFT)
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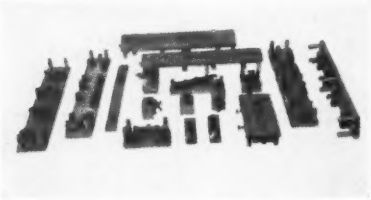
ALBERTSON & CO., INC.
SIOUX CITY, IOWA, U.S.A.

YOU GET *SPEED* PLUS ACCURACY WITH MOORE JIG BORERS

IN THE TOOLROOM

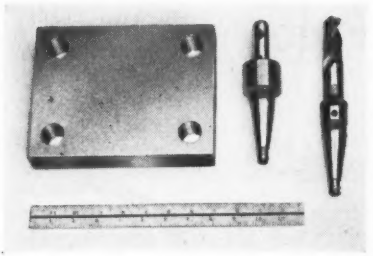
400 holes to "tenths"—5 to 7 minutes each on the No. 1 Moore Jig Borer



Manufacture of this group of drill jigs involves accurately locating, drilling and boring approximately 400 holes. The No. 1 Moore Jig Borer finished them to "tenths" in from five to seven minutes per hole.

ON PRODUCTION

64 holes to ±.0002"—2 minutes each on the No. 2 Moore Jig Borer



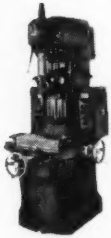
Sixteen pieces like this were located, drilled, bored and checked on a No. 2 Moore Jig Borer with one drill and one carbide bit. The 64 holes were finished in 2 hours and 8 minutes (plus 30 minutes setup) with location and size tolerances ± .0002".

Only a precision machine geared to the high American production standards of ruggedness *and* accuracy can meet these performance requirements. For versatility and speed in spotting, drilling, reaming, boring and checking operations in production as well as tooling, no other moderately-priced machine tool compares with the Moore Jig Borer. And there's no sacrifice of accuracy for speed, since the lead screw measuring system built into each Moore machine permits working to the closest of tolerances.

You'll find that the Moore Jig Borer can pay for itself—*in jig time*. Write today for detailed bulletins.

Moore Special Tool Company, Inc.
730 Union Avenue, Bridgeport 7, Conn.

NO. 1 MOORE JIG BORER
Table working surface of 10"x16". Over 1200 now in use throughout the world. The ideal small, accurate jig borer. Lead screws accurate to .0002" in 16".



NO. 2 MOORE JIG BORER
Table working surface of 10"x19". Heavier cuts, larger holes. Features infinitely variable spindle speeds, three power feed ratios, centralized control panel.

ADD MOORE TOOLS TO YOUR TOOLROOM

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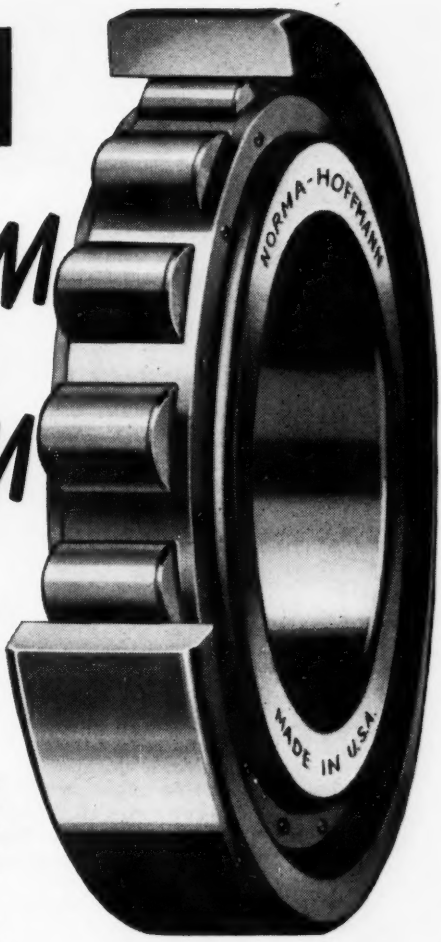
Norma-Hoffmann
PRECISION MADE
Roller Bearings

Give you MAXIMUM *Capacity in* MINIMUM *Space*



And equally important — they are *interchangeable* with single-row ball bearings

If your bearings must operate under such severe conditions as high speeds, heavy loads, temporary overloads, shock or vibration, *then Norma-Hoffmann Roller Bearings are the ones to use.* Here's why —

- Solid cylindrical rollers between cylindrical races provide maximum load contact area, increased steady load capacity, and a larger shock-absorbing capacity than any other type of single-row bearing.
- A safety factor margin ample for temporary overloads up to 50% beyond normal rating, as under peak loads, in unusually severe duty, or under shock conditions.
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- A lower friction coefficient under heavy load than any other type of bearing permits.
- Speedability equal to that of any ball bearing, size for size, up to 35,000 R. P. M.

Write for catalog or engineering assistance.

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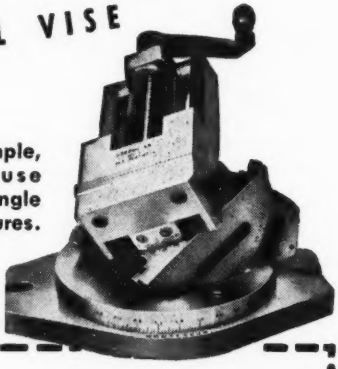
A WESSON UNIVERSAL VISE



Speedy, precision angle set-ups are simple, fast and economical when you use Wesson's 3-way Universal. Wesson angle vises eliminate many costly special fixtures.

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Hercules High Speed Drills are specifically designed to provide you with more efficient drilling of steel castings, steel forgings, and heat-treated steel.

These drills are made from grooved bar-stock that is rolled under closely controlled temperatures to our exacting specifications. These stringent "specs" provide drill stock that has uniform grain-structure and cross-section practically unobtainable by other methods.

In forming the drill flutes from this grooved bar-stock, a hot twisting process further adds to the texture of the steel and preserves the natural grain-structure.

Note the heavy web design of these drills, it also contributes to the unusual strength and durability that enables Hercules High Speed Drills to withstand greater torsion.

It will pay you in faster drilling and longer drill life to select Hercules High Speed Drills for cutting all grades of steel.

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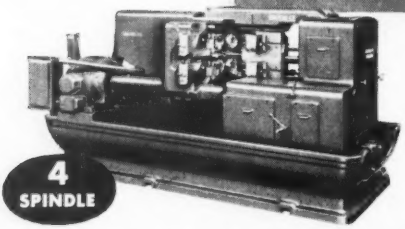
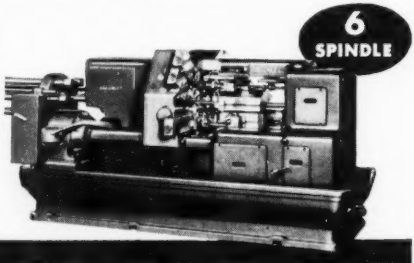
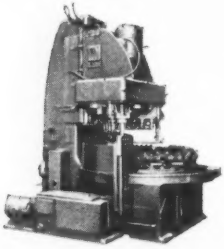


The Greenlee "Six" is available in 1", 1-5/8", and 2" capacity — the "Four" in 1-5/8" and 2-5/8" capacity. This range covers the majority of all machine-shop needs.

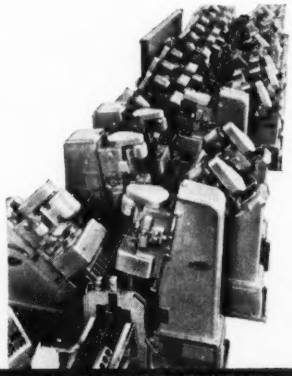


Greenlee Machines feature maximum economy of operation on short-run as well as long-run jobs . . . because of quick change-over, wide-open tooling area, great versatility, low tool cost, and a wide variety of accessories.

GREENLEE



The first Greenlee "special" machine was designed and built in 1918, and Greenlee was also a pioneer in the development of automatic transfer machines now widely used in the mass-production industries. Greenlee machines are made up of *proved* units and mechanisms, specially combined to perform specific work . . . consequently, they show remarkably good performance right from the start of their operation.



Special Machines

Descriptive literature available upon request.

PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
1885 MASON AVE., ROCKFORD, ILL.

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

For better grinding it's well worth having!

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It's Simonds Abrasive Company bulletin ESA 191 "Cylindrical Grinding Wheels" with recommended specifications—plus facts about feeds, speeds and wheel sizes. It's part of a *complete* library on Simonds products including wheels for rough grinding, finishing, cutting off, sharpening . . . abrasive polishing grain . . . mounted wheels and points . . . surfacing segments . . . everything *you* need for productive, economical grinding, factually described and supplemented with helpful hints. Write for ESA 191 . . . or for information on Simonds wheels for other grinding jobs. We'll also send name of your Simonds distributor.

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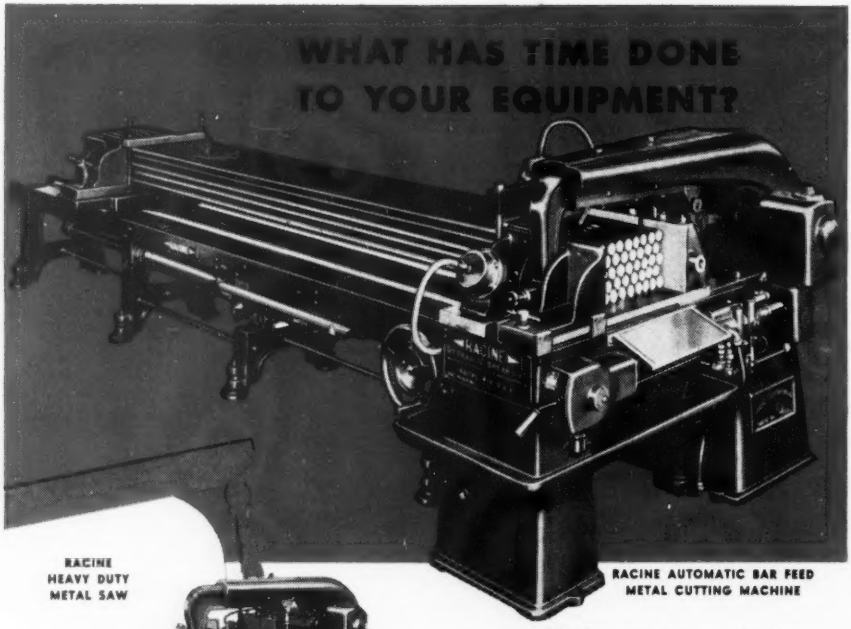
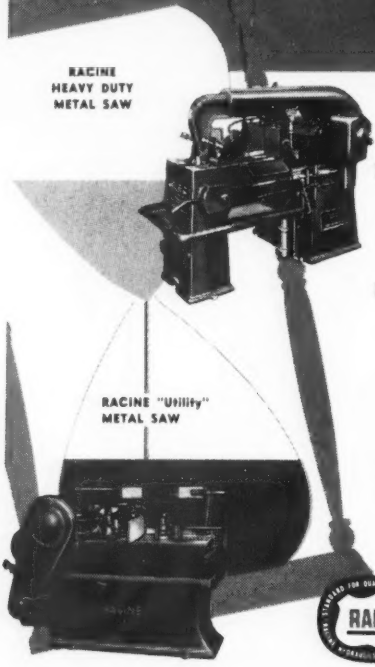
WHAT HAS TIME DONE TO YOUR EQUIPMENT?



RACINE AUTOMATIC BAR FEED METAL CUTTING MACHINE

RACINE HEAVY DUTY METAL SAW



RACINE "Utility" METAL SAW

Obsolete equipment can increase your production costs to such an extent it is difficult for you to be competitive with your products.

Take your metal cutting operation, for example. How much stock do you waste because of inaccuracy? What about subsequent excessive machinery to say nothing of short blade life and less cuts per hour. All of these build up costs that soon offset the price of a new power saw.

Investigate Racine's complete line of Hydraulically Operated and Hydraulically Controlled Metal Cutting Machines. Capacities 6″ x 6″ to 20″ x 20″ High speed — accurate and economical.

Write for descriptive Catalog and free production estimate sheets. Simply describe your work and needs. Address RACINE HYDRAULICS & MACHINERY, INC., 2070 Albert St., Racine, Wisc.

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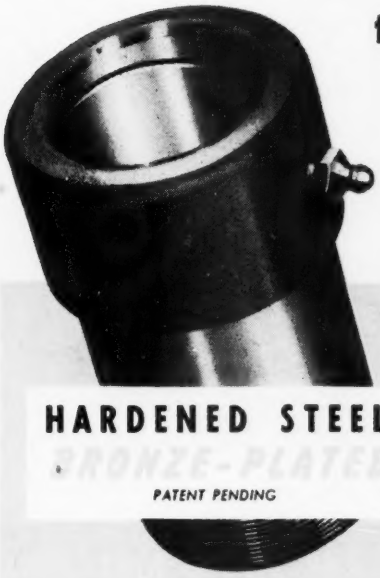
Now a long-wearing GUIDE-PIN BUSHING that WON'T SEIZE OR SCORE



Lamina Guide-Pin Bushings combine the long wearing of hardened steel with the free, smooth glide of bronze. No more seizing or scoring from hardened steel running on hardened steel . . . no more out-of-round wear characteristic of soft non-ferrous bushings . . . Lamina Bushings provide the answer to long, seize-free bushing service in punch and die shoes.

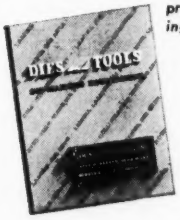
Lamina Guide Bushings are made of hardened steel with .001" to .002" of bronze electro-plated on the inside diameter. In addition to this, an oil groove, 3/32" wide is machined into the inside wall in a figure eight pattern. Each bushing is furnished with an alemite fitting for lubrication of the oil groove.

In actual use on hundreds of Lamina-built dies, in laboratory tests under conditions far more severe than shop conditions, these bushings without exception have proven absolutely trouble-free in service.

Stocked in a variety of sizes and lengths for straight pins, shoulder pins or removable pins. Specials made to order. **Lamina Dies & Tools, Inc., 14925 W. Eleven Mile Road, Berkley, Michigan.**

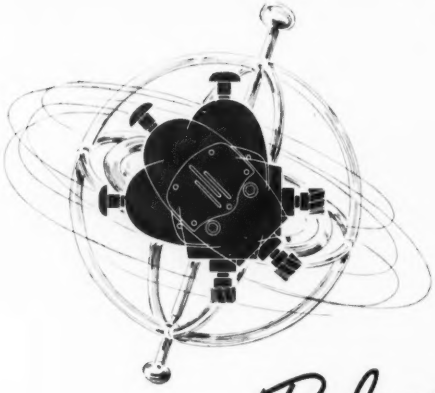
FREE BULLETIN

Send for Lamina bulletin which gives full details and dimensions on Lamina Guide Bushings. Also contains information on a variety of other Lamina tools, dies and job proven die making equipment.



Lamina

DIES AND TOOLS



Here's how to Balance Your Milling Production—

use VAN NORMAN RAM TYPE MILLERS

An important advantage of the Van Norman Ram Type Miller is its ability to meet daily fluctuating milling requirements. For example, one period may call for horizontal milling and another angular or vertical. By simply positioning the adjustable cutterhead and moving the ram, the operator is ready for the particular job.

Van Norman Ram Type Millers enable you to meet all milling jobs and keep all machines operating, saving you money by eliminating idle machine time so often encountered with single purpose machines. These advantages multiply if you have a number of Ram Type milling machines in use.

In addition, the adjustable cutterhead cuts idle machine time caused by work reset-ups by as much as 50%. Because the work stays in the original set-up, errors are eliminated, accuracy improved.

Find out how you can save with these versatile millers. Write for catalog, today.

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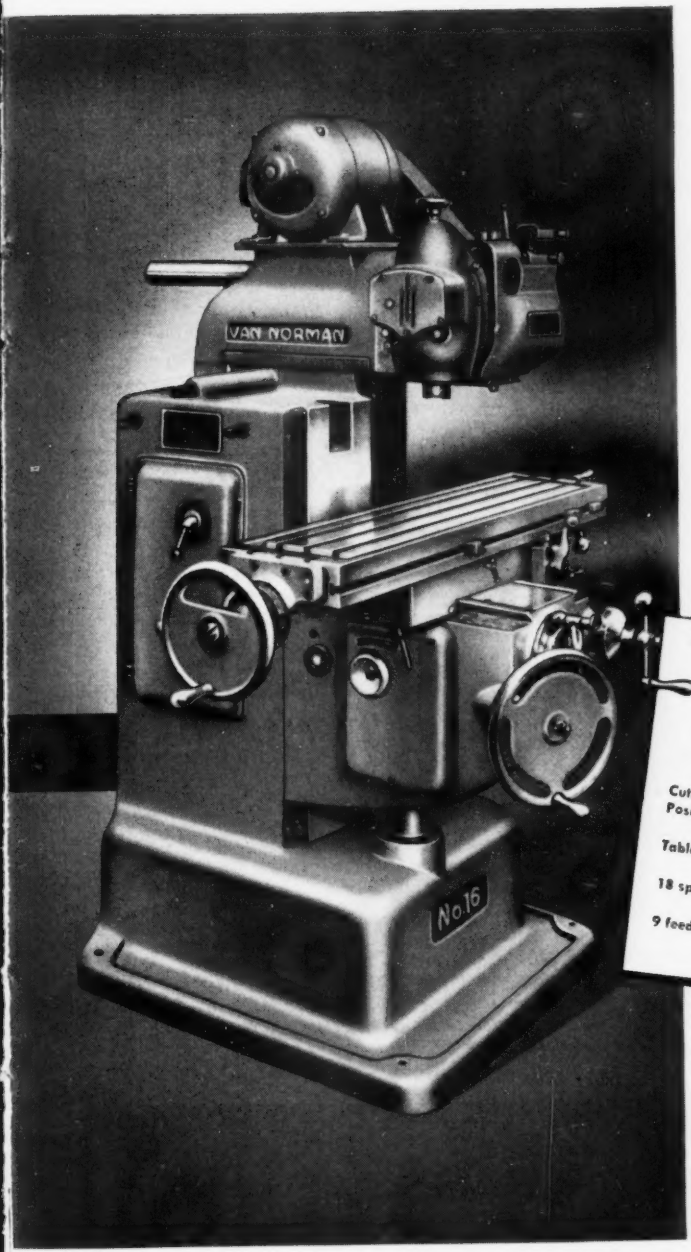
SPRINGFIELD 7, MASSACHUSETTS, U. S. A.



SPECIFICATIONS

No. 16

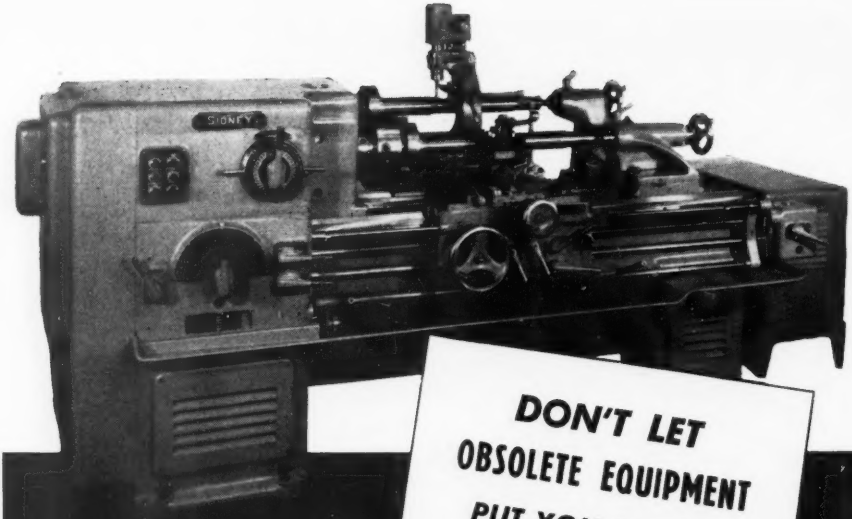
Ram Type Miller

Cutterhead in Vertical Position

Table: 37" × 9½"

18 speeds: 50 to 2000 RPM

9 feeds: 0.6 to 16 In. PM



DON'T LET OBSOLETE EQUIPMENT PUT YOU OUT OF COMPETITION

Old-fashioned, out-of-date and outworn equipment has no place in any modern industrial plant . . . and certainly plays havoc with your chances of competing successfully.

SIDNEY *FLUID TRACER* LATHES

THE "LAST WORD" IN

COST-SAVING EFFICIENCY

You save amazingly on production-time per piece — in large or small quantities. You save on maintenance. Result: your costs are reduced so that you can compete . . . and GET THE ORDERS!

The sensitive tracer head transfers every change in contour from the master piece or template to the cutting tool regardless of size, shape or quantity. Change-over to standard lathe operation or back to tracer requires only a few SECONDS since no addition or removal of extra parts is necessary.

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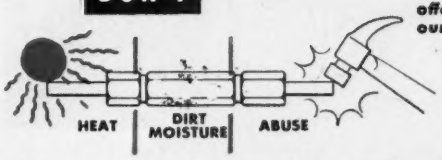
THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904

MAKE GAGES LAST LONGER

DON'T



*offered by Size Control Company as a service for our thousands of satisfied customers and friends.**

- ✕ Don't Force a gage into or over the part being checked.
- ✕ Don't lay gages on benches, machines or dirty surfaces.
- ✕ Don't clean gages in water, soluble solutions, kerosene or carbon tetrachloride — all cause rusting.
- ✕ Don't spin parts on or off gages. This induces rapid wear.
- ✕ Don't lay gages in the sunshine — expansion will cause errors.
- ✕ Don't use gages that fit loosely. Know the "feel" of proper gaging.
- ✕ Don't use gages that show visible burrs, nicks or other irregularities, and REMEMBER — reversing the plugs, end for end, and careful removal of a small segment of the leading edge when it becomes worn will provide up to six times longer useful life!

DO

- ✔ Learn how to properly hold and use your gages. Fit must be snug and smooth. Make wooden, felt covered gage racks. Oil the felt surface. This helps to keep your gages clean.
- ✔ Roll or twist the gages into the work slowly to get the proper feel.
- ✔ Check every gage against the master gages before using, at least once on every shift and before returning to the tool crib.
- ✔ *Include gaging expense as part of manufacturing budget. Quality product companies now do this.*

... AND insist on *all* of these quality features when you buy new gages:

- *Reversible Plugs* ... enable you to cut off worn tips at each end — use new section exposed for six to eight times more wear life.
- *Entire Plug Surface Usable* — straight untapered pieces provide uniform gaging surface over entire length — finish to 1.5 micro-inches RMS or less for maximum amount of wear life.
- *Pin-Vise Aluminum Handle* — positive locking; plugs can't slip. Easily loosened for replacing or reversing plug. Plug length adjustable for different hole depths.
- *Easy Recognition* — GO in green finish; NO GO red.
- *Special Hardening* — plugs hardened throughout ... enables you to grind down to smaller size ... gives greater economy.

We'd like to discuss your gage needs and have your gage orders. Our engineering representatives are located in all principal cities. Write or telephone us

8¼ x 11" reprints of this ad in three colors on heavy stock are available at no charge for posting in your factory.

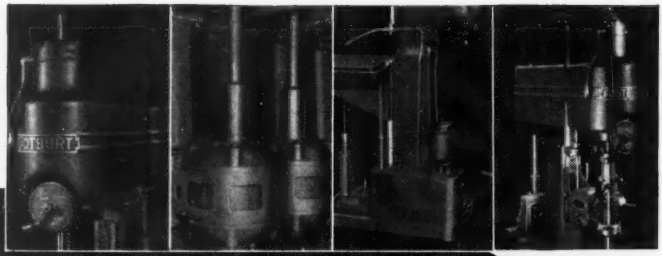
SIZE CONTROL COMPANY

2500 W. Washington Blvd., Chicago 12, Ill. MOnroe 6-6710

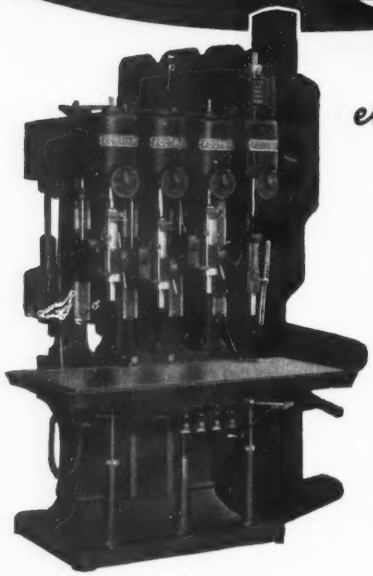
Division of American Gage & Machine Company

SIMPSON ELECTRIC COMPANY
5200 W. Kinzie St., Chicago 44, Ill. COlumbus 1-1221

WALSH PRESS & DIE CO.
4709 W. Kinzie St., Chicago 44, Ill. EStebrook 8-6700



faster...
for tool room
or assembly line



engineered for production

● The choice of fine machine tools now will help you meet those new production schedules. Footburt Sensatives are built with the wide range of speeds and with power and sturdiness to drive cutting tools to their full capacity. They are built with the care and precision that will keep them accurate over a long period.

Write, wire or phone for prices and delivery information.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio
Detroit Office: General Motors Building

● No. 2 Machine with Back Gear • 12" Overhang • 3/4" Drilling Capacity in Steel • Optional Speed Ranges • 185 to 2300 RPM • 280 to 3450 RPM • Vertical Motor Drive with Standard Single Speed Motor • Power Feed Assembly • Tapping Attachment • Coolant Outfit.

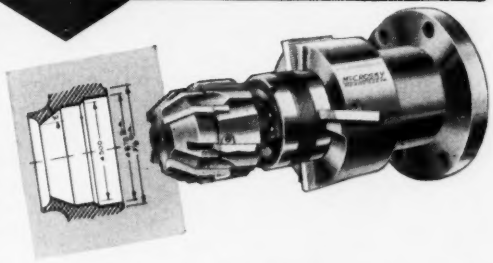
FOOTBURT
MACHINE TOOLS

McCROSKY

COST CUTTING TOOLS

Specially Engineered *Multiple Operation* TOOLS

cut machining and set up time, assuring unsurpassed uniformity and concentricity of finished work



Individually engineered to each particular job, McCrosky "Specials" combine related boring, facing, chamfering and reaming operations:— do them all at the same time with just one tool and one set-up, cutting costs and practically eliminating spoilage.

McCrosky's shop-tested features give them the strength and rigidity of solid tools and permit the blades to be released and adjusted for regrinding easily — saving time — and requiring fewer tools to keep a job running continuously.

Send for Bulletin No. S-17. It illustrates more than 40 applications and will suggest places where you too can use McCrosky "Specials" to produce better products, quicker and cheaper!

McCROSKY *Universal* MILLING CUTTERS

Body can rotate either right or left hand. Consequently, selecting blades with tips of proper material mounted at proper angles produces a cutter that meets any requirement. Write for Bulletin 531.

McCROSKY *Jack-Lock*® MILLING CUTTERS

Complete line, fitted with high speed steel, cast alloy or carbide tipped blades. Sizes from 3" to 24" to meet any requirement. Write for Bul. 17-M.

McCROSKY *Super*® *Adjustable* REAMERS

Chucking reamers with straight or tapered shanks, also shell reamers with tapered holes or large straight holes. Standard sizes from 15/16" to 6" in diameter. Write for Bulletin 18-R today.

McCROSKY *Turret* TOOL POSTS

These tool posts permit tools to be swung into position quickly, indexed accurately, and locked rigidly. Four styles—11 sizes. Write for Bul. 17-T.

McCROSKY *Wizard*® QUICK-CHANGE CHUCKS

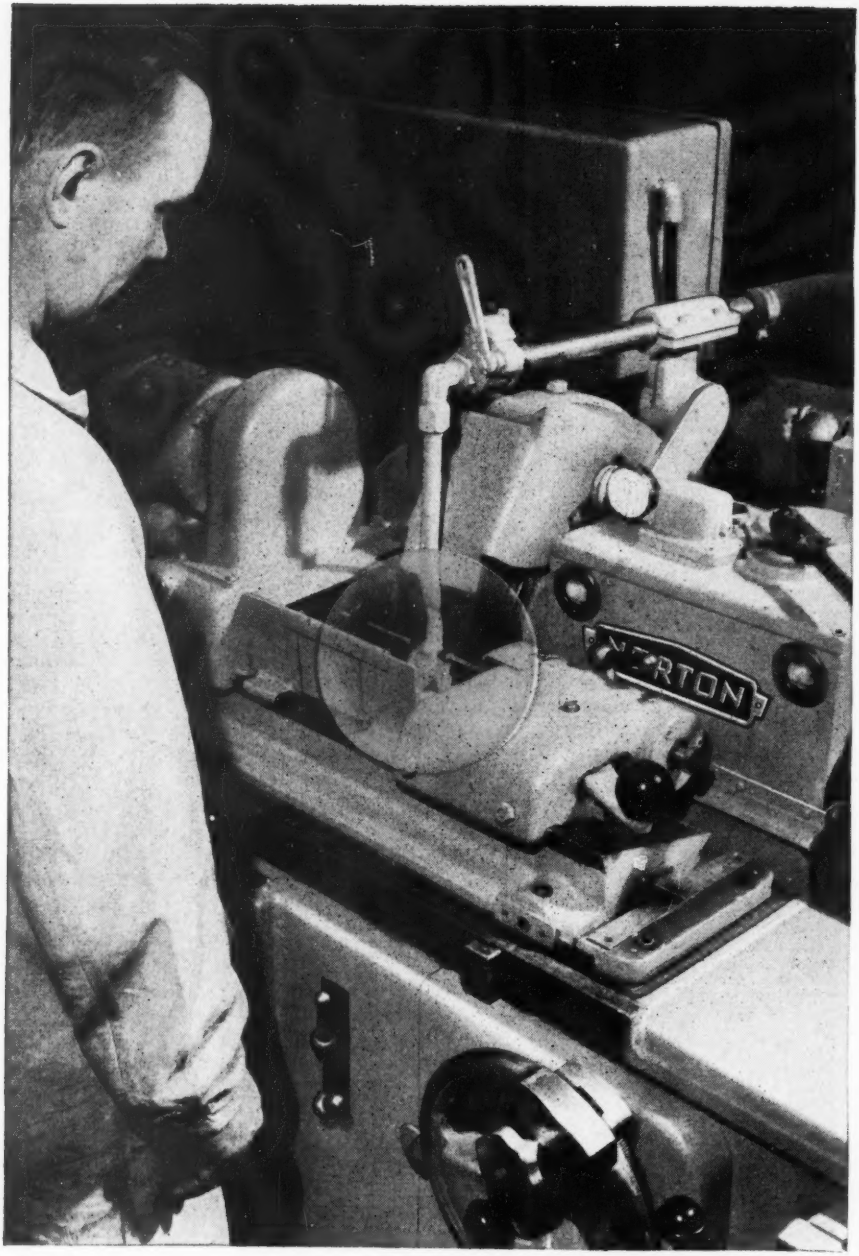
McCrosky's Wizard Quick-Change Chuck and Collet outfits hold tools centered and rigid. They enable the operator to change tools without stopping or slowing down the spindle. Write for Bulletin 18-C today.

McCROSKY *Block Type* BORING BARS

Individually ground, tapered V-key centers the block and cutting blades accurately and rigidly yet permits easy release for regrinding. Write for Bul. 17-B.

COST CUTTING TOOLS **McCROSKY TOOL CORPORATION**
MEADVILLE, PA.

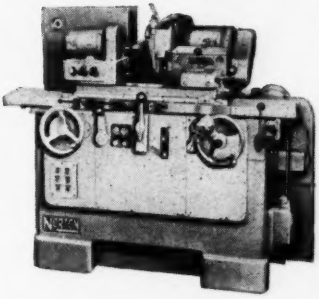
Engineering and Sales Representatives in the Principal Cities


RTON

SMALL PARTS PAY OFF BIG . . . WITH THIS

"TOUCH OF GOLD"

The new Norton 4" type CTU Cylindrical Grinder gives you high precision plus high production



Here's a cylindrical grinder you can get as either a Plain Machine for traverse work, or as a Semiautomatic for plunge operations — in 12" or 18" work length capacities in both models.

Either way you'll get the added "Touch of Gold" by faster, more accurate, more profitable grinding of a wide variety of small parts. Because either way the 4" Type CTU's Norton-developed features bring a new ease of operation for your men — and a new high in production quality and quantity for *you*.

To name just one of these advanced features, there's the extremely rugged wheel spindle unit that assures enduring precision in jobs ranging from heavy stock removal to fine finishing. But why not get the whole story of this speedy, profit-boosting grinder from your Norton Representative?

Write for Catalog No. 531. And remember: only Norton offers you such long experience in both grinding wheels and machines — your assurance of the value-adding "Touch of Gold" that means better products at lower cost. NORTON COMPANY, Worcester 6, Massachusetts.

To Economize Modernize With **NEW**

NORTON

GRINDERS and LAPPERS

Making better products to make other products better

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit
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Among the many contractors who make these 50 caliber, 60 caliber and 20 m/m brass and steel cartridge cases, a few use machines that are strictly special—designs that will be practically scrap value, so far as adaptability to other work is concerned, when the shell job is finished.

Many more millions of these shell cases are now being machined on

Standard 6 Spindle ACME-GRIDLEY Bar Automatics

Some of these standard machines are equipped with magazines loaded by hand, as on the job illustrated, others with fully automatic hopper feeds—reducing man hours to minimum.

And with simple carbide tools output is fast—in fact **1.5** seconds (2,400 per hour).

* * *

WHAT'S THE PAYOFF? Just this—when the job is done, Acme-Gridleys can quickly be retooled—good for years more service on peace-time parts production. Quite a difference in investment value and long terms profit.

Whatever your specific bar automatic needs today, consider also the value of these machines tomorrow—the importance of Acme-Gridley basic universal application and modern tooling ingenuity.

We've built more than 45,000 of them—in sizes up to 7¾" capacity.

here today...

BUT

what about tomorrow?

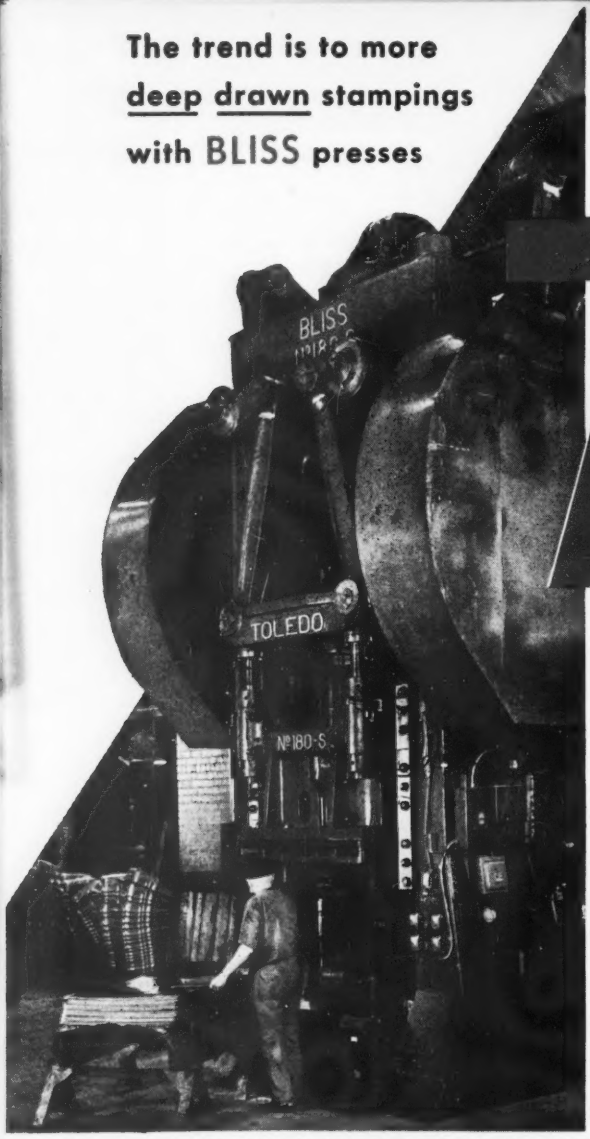
You can't do TODAY'S *job . . . with* YESTERDAY'S *tools . . . and be in business* TOMORROW

The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics, 1-4-6 and 8 Spindle —Hydraulic Thread Rolling Machines—Automatic Threading Dies and Taps—Limit, Motor Starter and Control Station Switches—Solenoids—Contract Manufacturing.

The trend is to more deep drawn stampings with BLISS presses



Bliss 650-Ton Single-Crank Toggle Drawing Press, latest addition to Transue & Williams' press room, is producing deep drawn stampings at rate of five strokes per minute.

74%

of presses at Transue & Williams are BLISS-built!

As specialists in deep drawn parts, Transue & Williams of Alliance, Ohio, require dependable and specialized production facilities to make full use of their widely-recognized designing ability. So it's significant that they depend largely on Bliss for presses.

Of the 35 presses in the T & W shop, 26 or 74%—are Bliss-built. And practically all the larger presses, including a new 650-ton draw press, are of Bliss manufacture.

Transue & Williams average nearly 200 deep draws an hour on their Bliss presses. For *extremely deep* draws, they find that a particularly valuable feature of these presses is the combination of hydro-pneumatic die cushion and positive knockout in the bed.

The outstanding advantages Transue & Williams get in Bliss drawing presses result from Bliss' long experience in building this type of equipment. *Whatever* type of press you need, why not call in a Bliss engineer? You'll find that Bliss builds it—and builds it better.

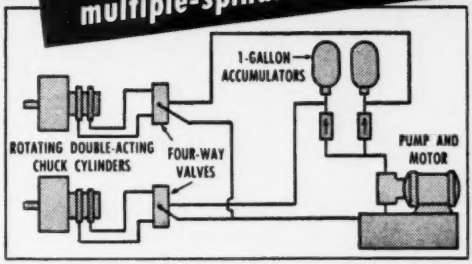
E. W. BLISS COMPANY, CANTON, OHIO
E. W. Bliss (England) Ltd., Derby, England
E. W. Bliss Company (Paris), St. Ouen sur Seine, France
PRESSES, ROLLING MILLS, SPECIAL MACHINERY
U. S. plants at Canton, Salem, Toledo, Ohio; and Hastings, Michigan
Branch offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo, and Toronto, Canada. West Coast Representatives: Moore Machinery Co., Los Angeles and San Francisco; Star Machinery Company, Seattle. Other dealers in United States cities and throughout the world.

BLISS

ON YOUR PRESS IS MORE THAN A NAME...IT'S A GUARANTEE!

IMPACT for Chucking

GREER ACCUMULATORS deliver hydraulic SURGE on multiple-spindle machines



Functions Performed by GREER ACCUMULATORS

1. Pressure Storage Chamber
2. Pressure-volume Compensator
3. Dispenser of Fluids
4. Transfer Barrier
5. Shock Absorber

Greer Accumulators deliver the hammer-like blow on the chuck jaws required to seize and release work on automatic multiple spindle machine tools. In the above simplified, schematic diagram the Greer Accumulator not only supplies power for actuating the chucks but also maintains line pressure for holding the work securely. A low-volume, high-pressure pump charges the accumulator during intervals between chucking. Without the accumulator, a pump to deliver the required surge of fluid would have to be so large and costly as to be economically impractical.

Let us help you to reduce the size, cost, and complexity of your equipment. No obligation. Write or phone.

Greer Hydraulics, Inc.
471 18th Street,
Brooklyn 15, N. Y.

Sales Representatives in Principal Cities

GREER
ACCUMULATORS
U. S. PATENTS UNDER OLAER LICENSES

District Offices: 407 So. Dearborn St., Chicago 5 • 2832 E. Grand Blvd., Detroit 11

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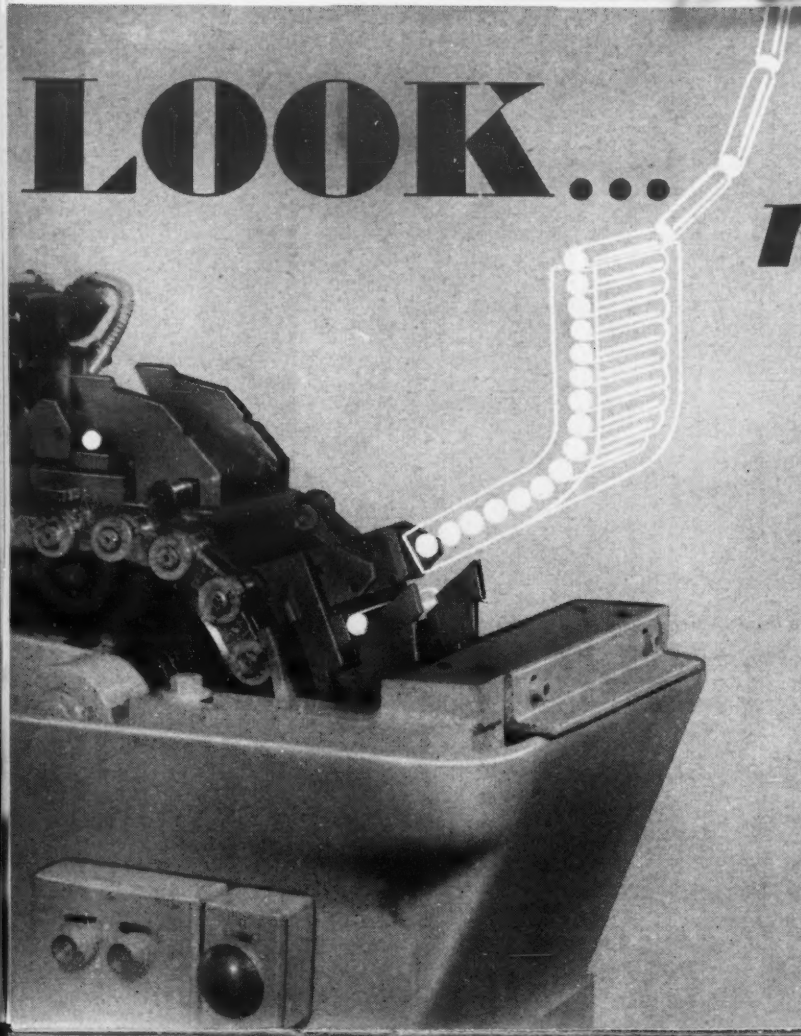
LOOK... *no hands!*



AUTOMATIC HANDLING *plus* CONTINUOUS BROACHING

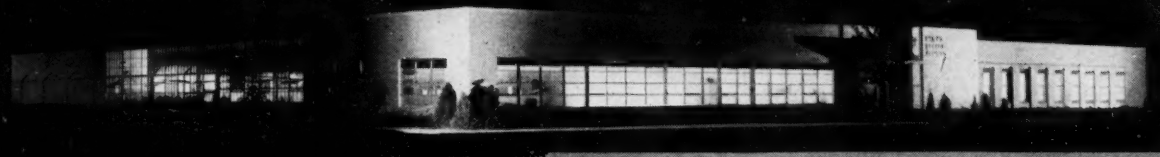
Combined to Increase Production 125%

Detroit Broach adds a new dimension in broaching economy . . . automatic handling of the work. By eliminating manual loading, production ceilings are raised, costs are lowered and continuous efficiency is assured *independent of the human element.*

The application above—facing the ends and producing a flat on automotive king pins—illustrates typical benefits. Here, Detroit Broach applied a hopper and feed mechanism to a continuous broaching machine and thus eliminated manual loading of the parts. Precision tolerances are consistently held, production runs continuously and costs are at rock bottom. In this application the hopper is loaded manually, however, in many instances the hopper can be fed by conveyor from the previous operation.

On present or proposed broaching operations it will pay you to discuss automation with Detroit Broach engineers. Chances are these broaching specialists will be able to come up with recommendations that will result in considerable savings for you. If you will just drop us a line, the nearest Detroit Broach representative will give you all the details without obligation.

WORLD'S LARGEST MANUFACTURER OF BROACHES AND BROACHING TOOLS EXCLUSIVELY



DETROIT BROACH COMPANY

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NIAGARA Presents

outstanding design features:

Double End Twin Drive with double reduction gearing (for straight bends and smooth power application.)

A rigid One-piece Frame with permanently welded crown for minimum deflection and permanent alignment.

Laminated Non-Metallic Ways maintain accurate alignment and assure longest life of dependable service.

Deep Twin Plate Steel Bed with open slug clearance for multiple punching work.

Powerful Air Cooled Friction Clutch and Brake assures easy ideal "Press Brake Action".

Air Electric Clutch Control may be operated by palm buttons on ram or foot switch with provisions for "Inching", "Single Stroking" and "Continuous Run".

Reversible Flywheel can be pulled out of accidental stalls.

Power Adjusted Ram with self-locking adjusting screws.

Micrometer Dials accurately indicate position of ram so die settings can be quickly repeated.

Accessibility at rear with plenty of clear working space for safety.

Gages with full horizontal and vertical adjustment for front or rear of press.

Angle Support Brackets and Bolster Plates quickly convert press for stamping operations without affecting bending ability.

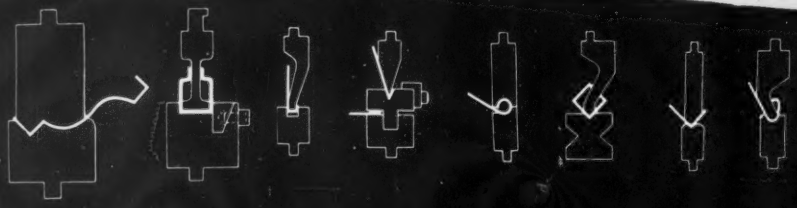
All gears operate in totally enclosed sealed baths of oil.

versatility of operations

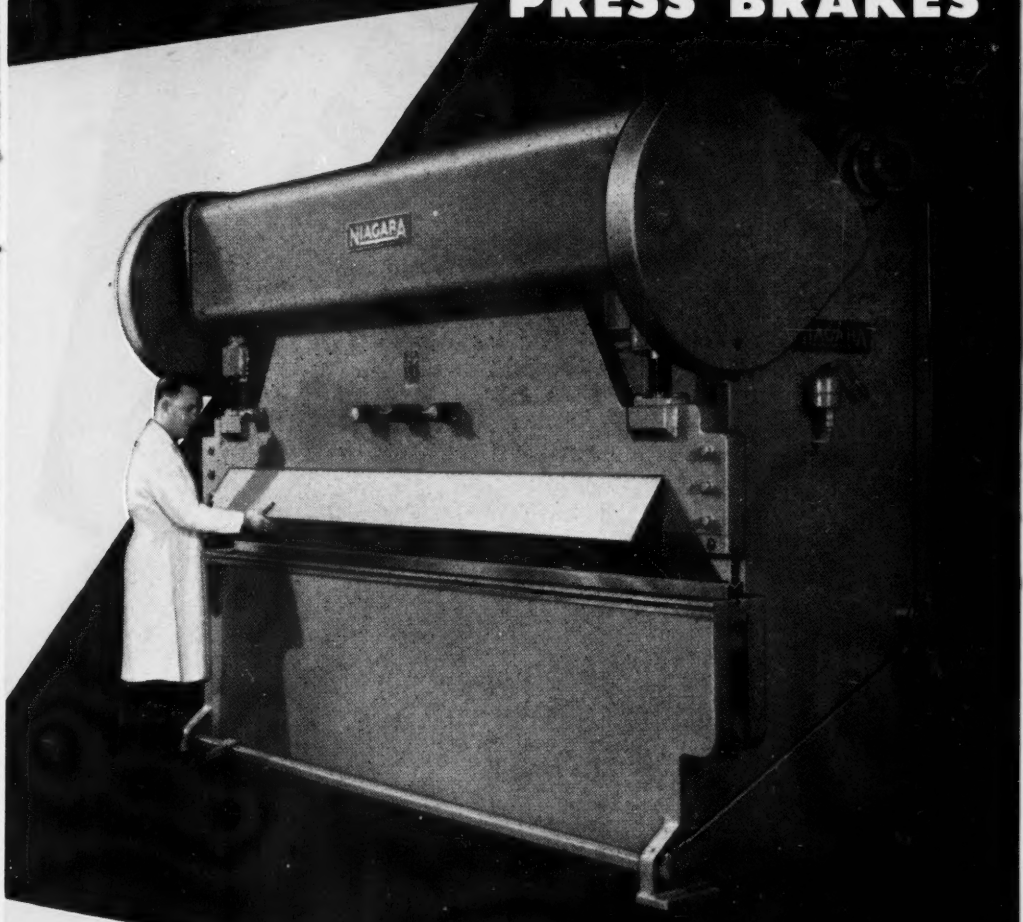
BENDING	JOGGLING
FORMING	NOTCHING
DRAWING	PUNCHING
BEADING	PIERCING
CURLING	PERFORATING
CORRUGATING	SLITTING
BLANKING	TRIMMING
EMBOSSING	ETC.

WRITE FOR BULLETIN 89

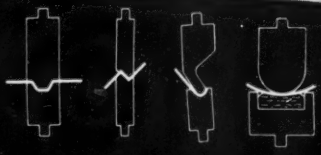
NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.



The Last Word in New All-Steel
PRESS BRAKES



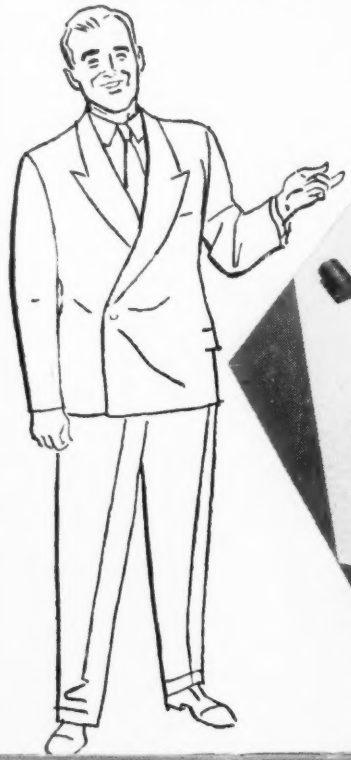
DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK, PHILADELPHIA

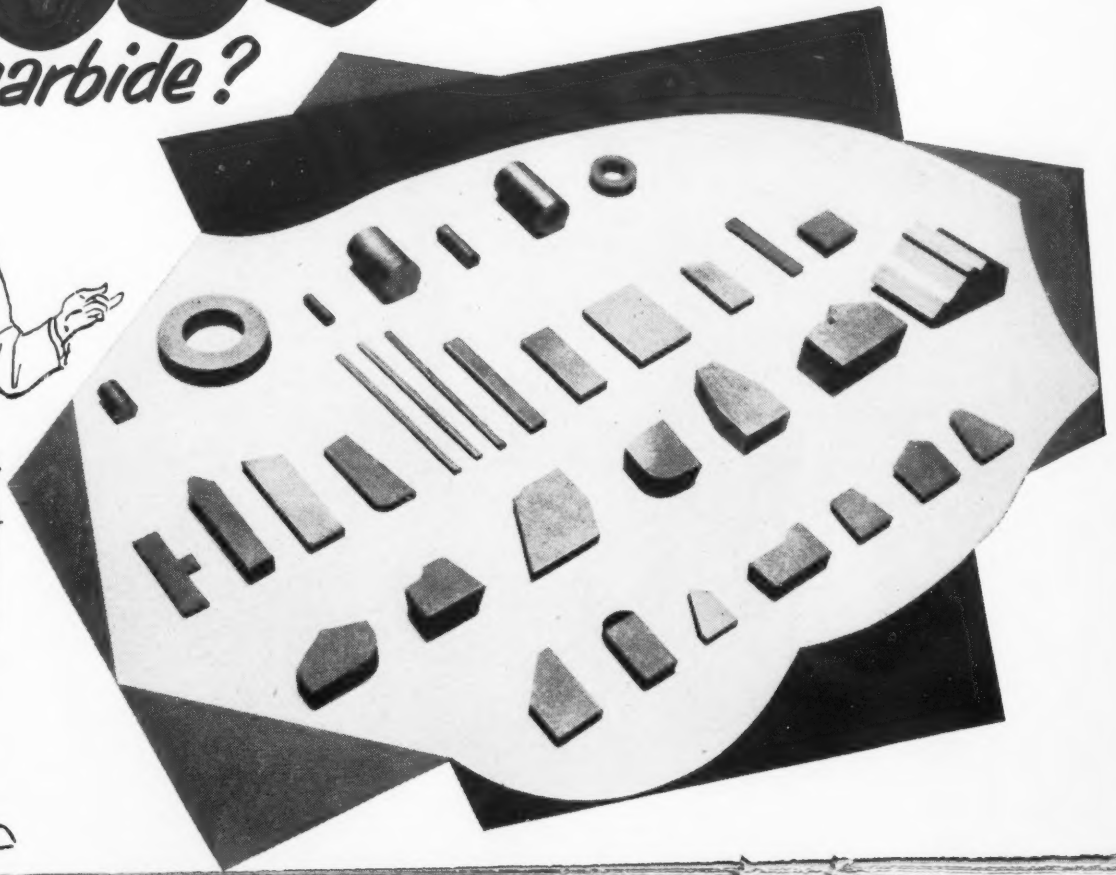


America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

Dealers in principal U. S. cities and major foreign countries

Need ODD shapes and sizes of carbide?





We press or preform to your designs in CARMET

to save you expensive grinding!

GET THE NEW CARMET CATALOG

Just out . . . 32 well-illustrated pages, containing data on all Carmet grades, and on Carmet blanks, tools, die sections, punches, draw die inserts, etc.; also special preforming to order. • *Write for your copy.*

ADDRESS DEPT. MS-41

When the exact shape and size of Tip you need is not to be found in carbide producers' catalogs, what should you do?—(1) order the Tips that seem to be adaptable, and then go to the expense of grinding them down to suit—or (2) ask CARMET to build you a die that presses the Tips to *your* designs? The answer is obvious! Save costly grinding.

Each one of the designs pictured above was pressed or preformed by us in quantity to the specific requirements of some individual customer. No excess metal remained for costly removal.

For suggestions, call or write your nearest A-L representative today. • *Allegheny Ludlum Steel Corporation, Carmet Div., Wanda & Jarvis Aves., Detroit 20, Mich.*

For complete MODERN Tooling, call

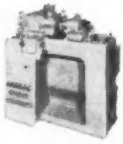
Allegheny Ludlum

WAD 3988

AL

FINE TOOL STEELS SINCE 1854

bryant
internal grinding



no. 1309-W

Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6". Max. grinding length, 3½".

no. 1109

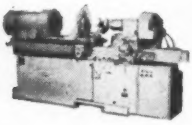
For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3½".

no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, ¾".

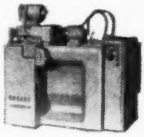
no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".



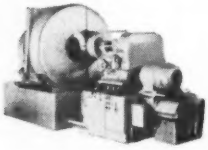
no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".



no. 1209

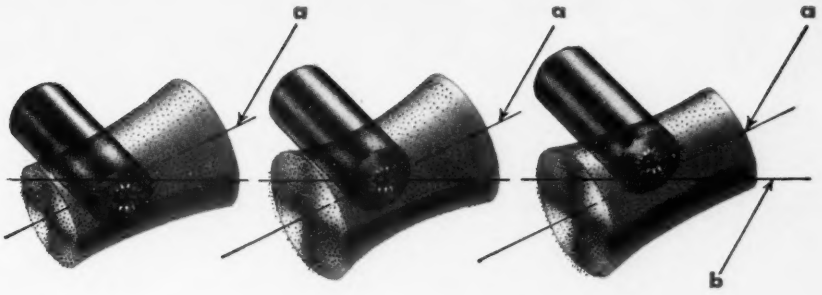
A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".



no. 1460

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".

"Alignment for Better Internal Grinding", a new, sound color moving picture is available for free showing to engineering groups. Write for descriptive booking form.



USERS of internal grinders generally believe that once the grinding wheel passes the diamond, the form of the wheel will be a perfect cylinder. If the wheelhead is tipped so that its center line is not parallel with the motion of the longitudinal ways, the wheel cannot be trued to a perfect cylinder. In our illustration each wheel is tipped as it passes the diamond. Even though the diamond describes a straight line across the surface of the tipped wheel, the wheel will not be trued to a perfect cylinder. This is because the wheel is not being moved on a path along its own center line. When the wheel is tipped so that its center line "a" does not coincide with its direction of travel "b" as the wheel passes the diamond, an apparent taper "1" or "3", or an hour-glass "2" will be generated on the wheel. The vertical position of the diamond determines which one of these three forms will be produced on a tipped wheel. In this case we have two variables; that is, the wheel axis "a" may not coincide with its direction of travel "b", and the diamond may be above or below center.

Taper due to tipping of the wheel can be identified by raising or lowering the diamond. If the wheel is tapered as in "1" and after raising the diamond the form changes to "2" and again, after raising the diamond, the taper changes to "3", the front of the wheel (left end in illustration) is low and the wheel is tipped down. On the other hand, if the small diameter of the taper moves from right to left on the wheel as the diamond is progressively raised, the front of the wheel is tipped up.

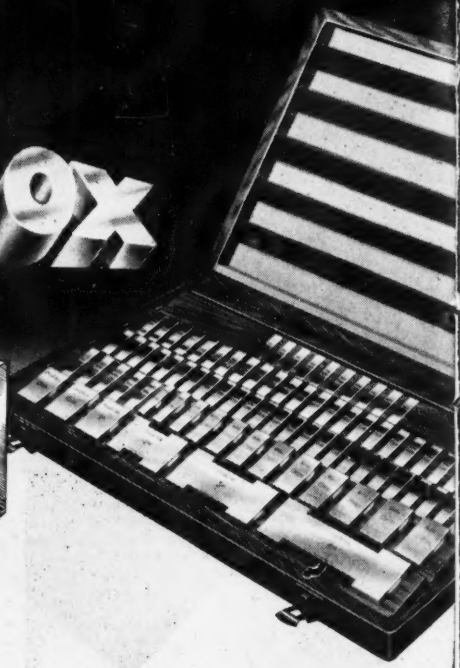
An error in wheel form similar to those illustrated cannot produce a good hole either for size or shape, since there can be no straight line of contact for the full length of the wheel and the full length of the work as the wheel traverses. Furthermore, this distortion in the form of the wheel cannot be eliminated by simply turning the workhead. The remedy is to correct the alignment by bringing the wheel center line parallel with the wheel path (direction of wheel travel) and to the same height as the workhead center line, and setting the diamond in the plane established by the wheelhead and workhead center lines.

Bryant Chucking Grinder Company
Springfield, Vermont, U. S. A.

Internal grinders • Internal & External thread gages

Croblox

(CHROME CARBIDE)



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Expansion Similar to Steel!

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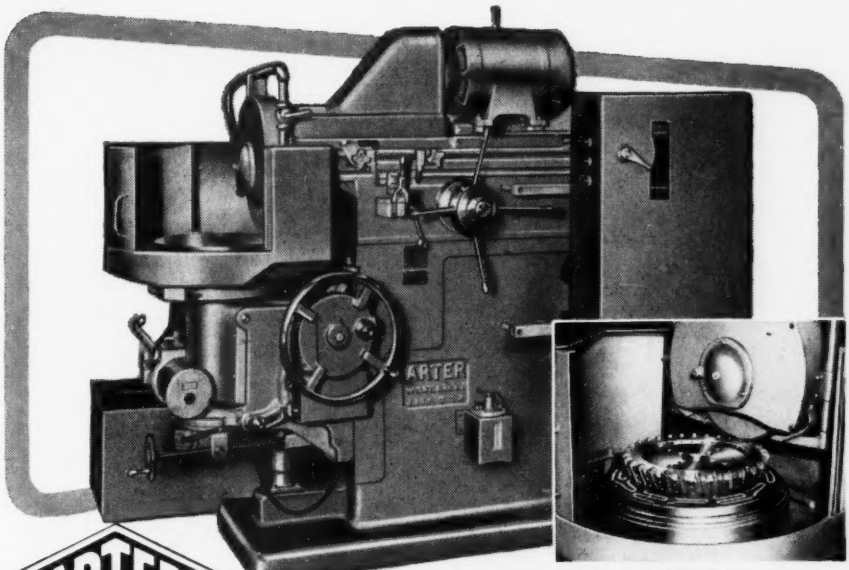


FIGURE 1

ARTER

MODEL D

HYDRAULIC ROTARY SURFACE *Grinder*

... for work requiring the utmost precision for flatness, size and finish.

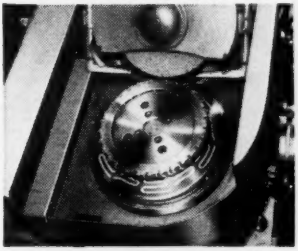


FIGURE 2

FIGURE 1—Inserted carbide tooth milling cutters ground on standard machine.

FIGURE 2—Machine built especially for grinding 45° angles on cutters.

FIGURE 3—Special Model D grinds by plunge cutting; work fed automatically up to non-oscillating grinding wheel.

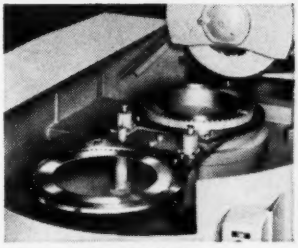


FIGURE 3

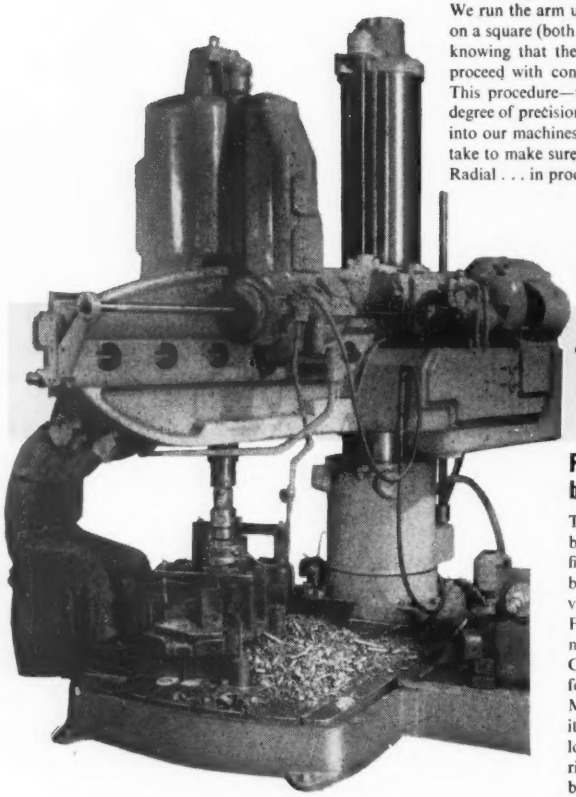
Arter GRINDING MACHINE CO.

WORCESTER 5, MASSACHUSETTS

Here's another reason it pays to get a proposal from Fosdick

Fosdick aligns the column

Radial alignment at Fosdick starts with the column. We run the arm up and down with an indicator bearing on a square (both lengthwise and across the base). Then, knowing that the column is square with the base, we proceed with conventional tramming and sweep tests. This procedure—used only by Fosdick—adds an *extra* degree of precision to the extra rigidity we have designed into our machines. It's another example of the pains we take to make sure you get the most out of your Fosdick Radial . . . in production, tool life, finish, tolerance.

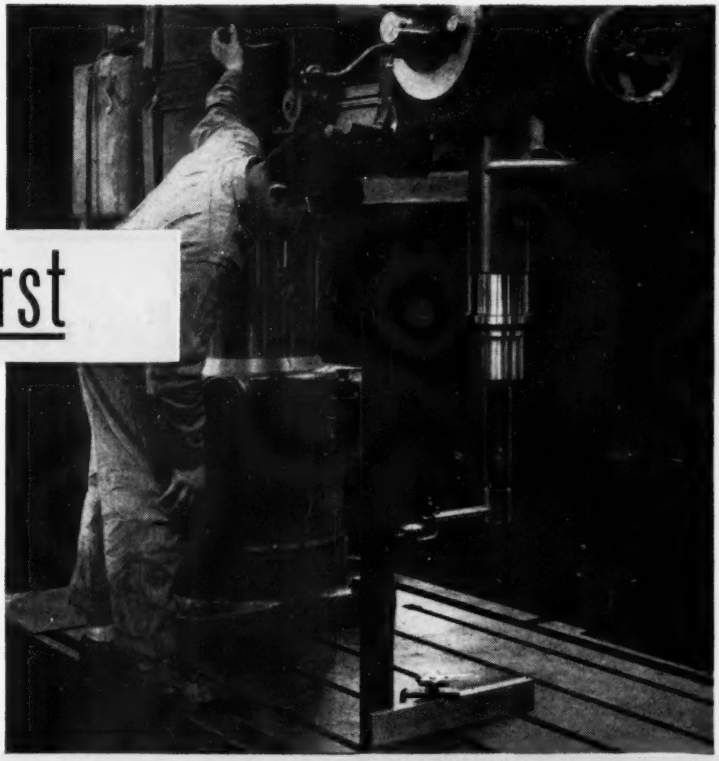


Fosdick Hydraulic Radials are available with 3′ to 8′ arms, 11″ to 19″ columns. For full information, ask for Bulletin HRS.

to give you

Fosdick takes a "bite" out of boring time at Owen Bucket

Tough cast-steel hinges for clamshell buckets are bored to ± .001″ for a press-fit cast iron bushing—then counter-bored for a washer. For this and a variety of other heavy-duty drilling, Fosdick's proposal on a 5′ 17″ Radial made sense. Now Owen Bucket Co. of Cleveland gets 10 pieces in the time formerly needed to produce 7. As Frank Matisak, General Superintendent puts it, "... now we can do more pieces with longer tool life—this machine is more rigid, giving us closer tolerances and better finish."



First

precision production like this

Need Drilling Equipment? Get a Proposal from Fosdick!

Radial Drills

Jig Borers

Sensitive and Upright Drills

Sensitive Radial Drills

Automatic Positioning Machines

FOSDICK

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

MORE for your Press Dollar...

with the NEW Rodgers Blue Ribbon Line of Platen Presses

HERE'S WHY

SIZE: Any platen size from 12 x 12 to 60 x 60 inches.

CAPACITY: Any capacity from 10 to 500 tons.

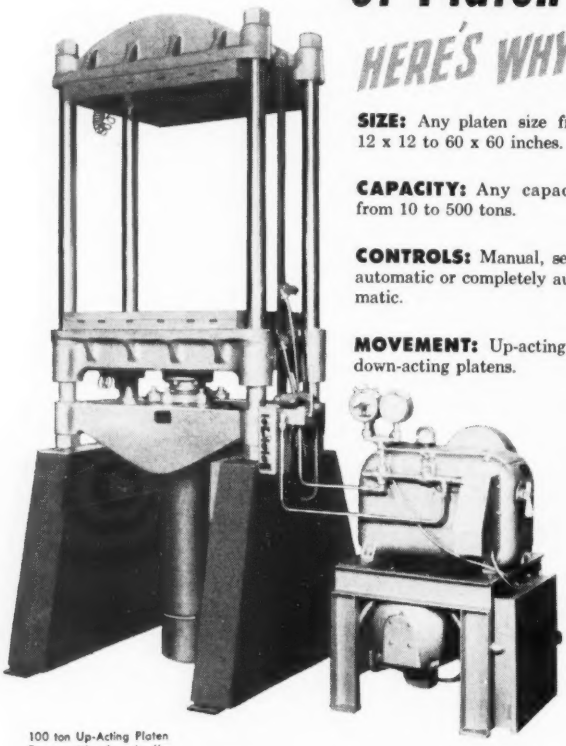
CONTROLS: Manual, semi-automatic or completely automatic.

MOVEMENT: Up-acting or down-acting platens.

PUMPS: Simple positive displacement hydraulic pumps or combination hydraulic pumps with various approach or return speeds.

PLATENS: High grade cast steel guided by heavy bronze bushings and ground and polished cold steel rods.

UTILITY: Select the press to best suit your needs in plastic molding, rubber molding, laminating, metal forming shaping; also special presses die tryouts and other utili.. operations.



100 ton Up-Acting Platen Press with electrically heated platens—platen area 24 x 36 inches.

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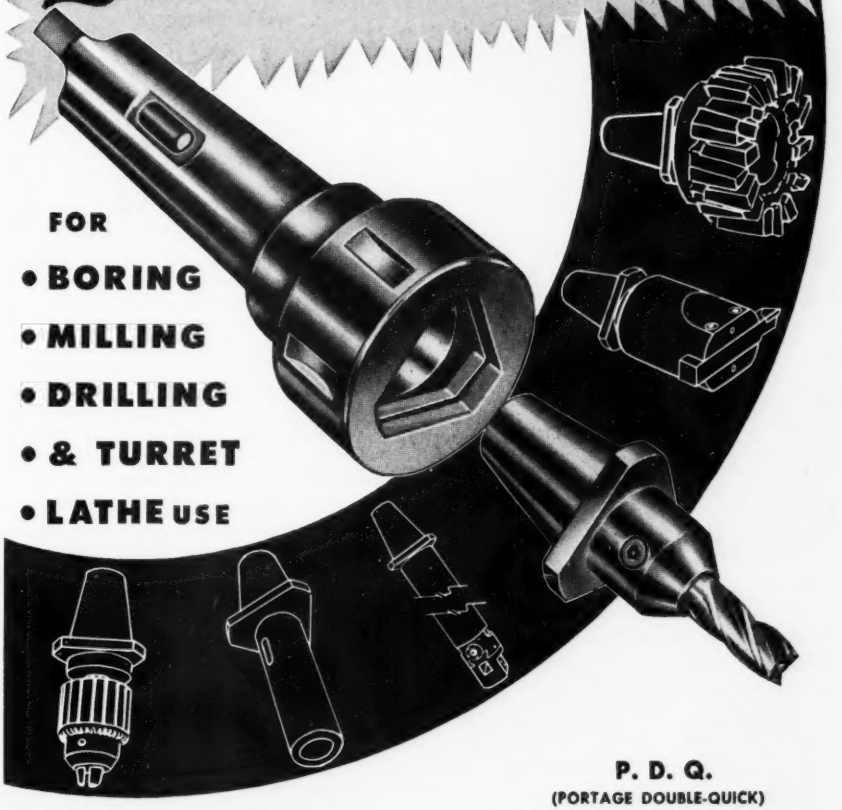

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Changes from one tool to another is a matter of seconds. Three point locking feature and tapered shank assures repositioning and eliminates "run out."
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with that

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For All Metals . . .

One-Operation, Burring, Finishing, Cleaning & Polishing

Products of Weldon Roberts Rubber Co., pioneer manufacturer of rubber-bonded abrasives, new, performance-proved BRIGHTBOY BL Abrasives have a definite place in every metal working industry! They fill the rapidly increasing demand for rubber-cushioned abrasives particularly made for fast, smooth finishing of stainless steels, forged aluminum and other metals. *Reason:*

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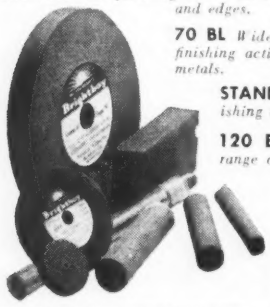

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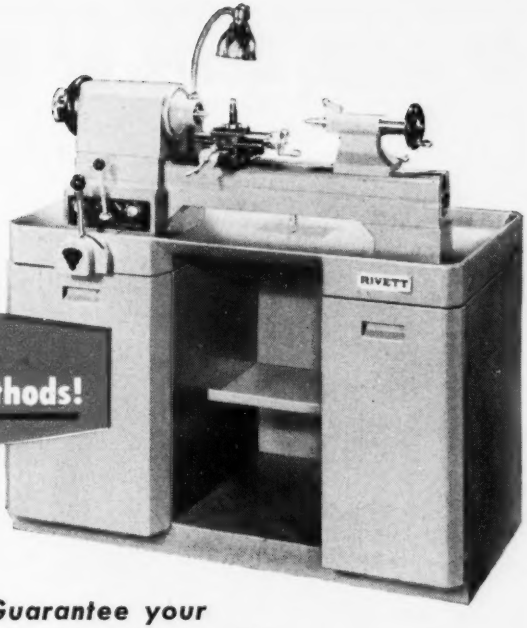

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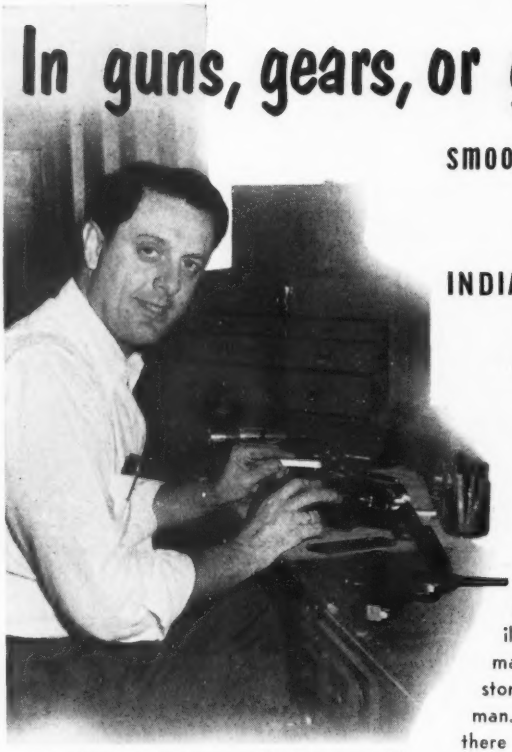
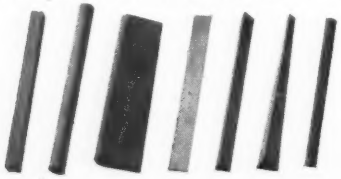
INDIA® and HARD ARKANSAS* OILSTONE FILES



"Couldn't do business without 'em," said Mr. Austin Behlert, prominent gunsmith of Cranford, N. J., as he reached for a HARD ARKANSAS Oilstone File to finish stoning a gun part to get the smooth action that all marksmen value. Mr. Behlert has for years kept close at hand a complete set of oilstone files.



• Wherever there's a metal-to-metal moving contact, there's a spot that would probably be better for the touch of an INDIA or HARD ARKANSAS Oilstone File. The smooth, even pull of a trigger, the smooth roll of gear-tooth on gear-tooth, the precision fit of die parts — these and many similar mechanical actions respond magically to the touch of an oilstone file in the hands of a craftsman. Where these stones are needed, there is no substitute for their use.

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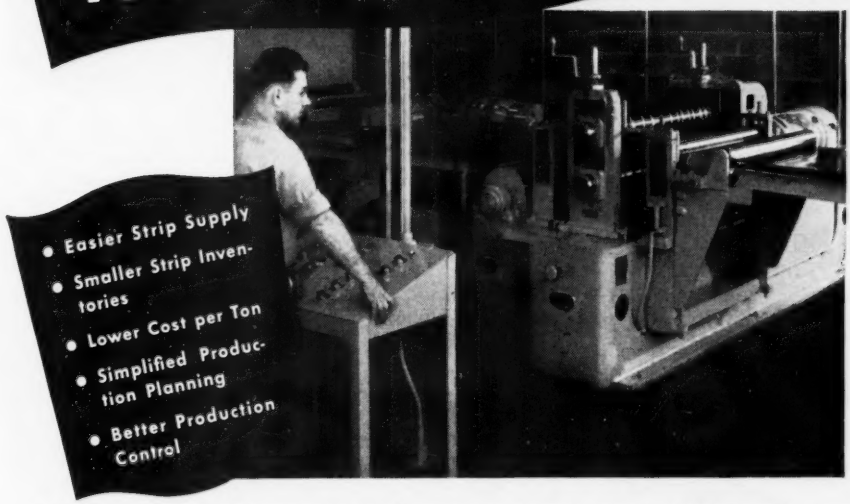
YODER *Multiple Rotary* SLITTERS



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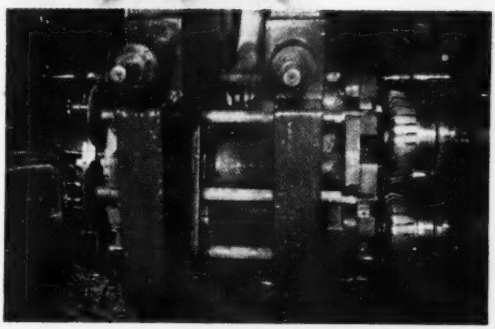

ACTUAL JOB
Large Automobile Plant

Machine.....Davis Thompson Milling Machine
Part.....Rear axle shaft
Operation....Rough and finish mill spline end
Material.....S.A.E. 1038–Brinell Hardness 179-229
Tools.....Wesson 6" and 8" dia. Milling Cutters–fine pitch–inserted blade
Speed.....8"–387 S.F.M.
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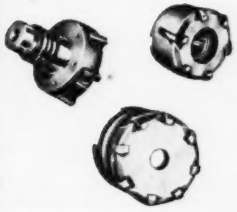
Feed.....14" per minute
Production...150 pcs. per hour
1500-1700 pcs. per grind
Grade of Carbide....Wessonmetal WM

SAVINGS OF OVER $14,225 PER YEAR ON ONE MACHINE WITH ONE SET OF WESSON TOOLS

OLD METHOD	NEW WESSON ENGINEERED METHOD
Cost 1 set Inserted Blades.....$48.00	Cost 1 set Inserted Blades.....$54.60
Pieces per Grind.....275	Pieces per Grind.....1600
Grinding Hours per year.....10,300	Grinding Hours per year.....2500
5 Machines Running 3 Shifts	3 Machines Running 2 Shifts
Machine Repair per year.....$25,000	Machine Repair per year.....$1200
Tool Cost per Piece.....$.00545*	Tool Cost per Piece.....$.00213*

(Machine repair and grinding costs not included)

HOW IS YOUR PRODUCTION SCORE CARD!



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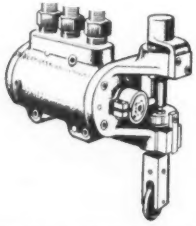
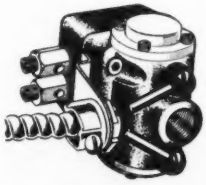


USE UNBRAKO SOCKET CAP SCREWS for compact designs to save space, weight and material in machine tools and equipment.



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Before you specify a special socket screw, check UNBRAKO Standards. A standard UNBRAKO will do the same job much cheaper in most cases. You'll get better service and faster deliveries, because UNBRAKO socket screw products are stocked by your industrial distributor. Write for UNBRAKO Standards. SPS, Jenkintown 22, Pa.

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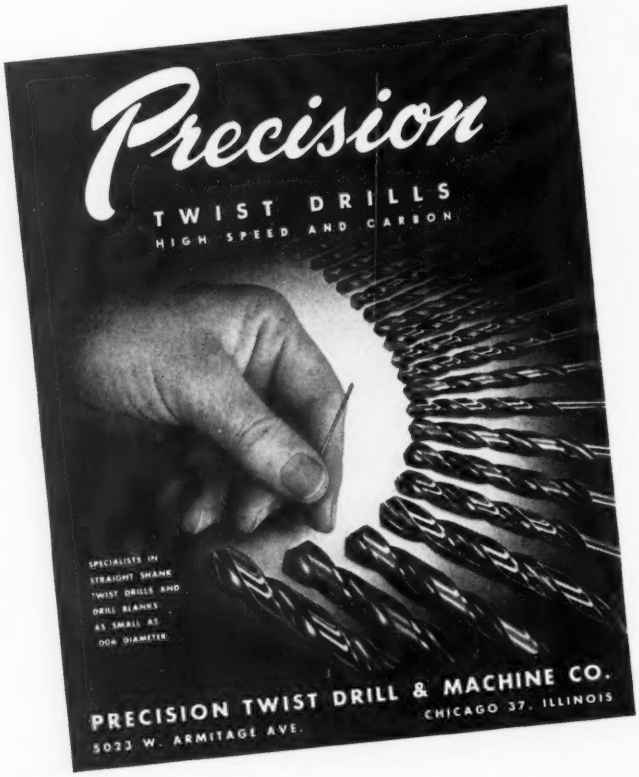
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SPECIALISTS IN STRAIGHT SHANK TWIST DRILLS AND DRILL BLANKS AS SMALL AS .004 DIAMETER
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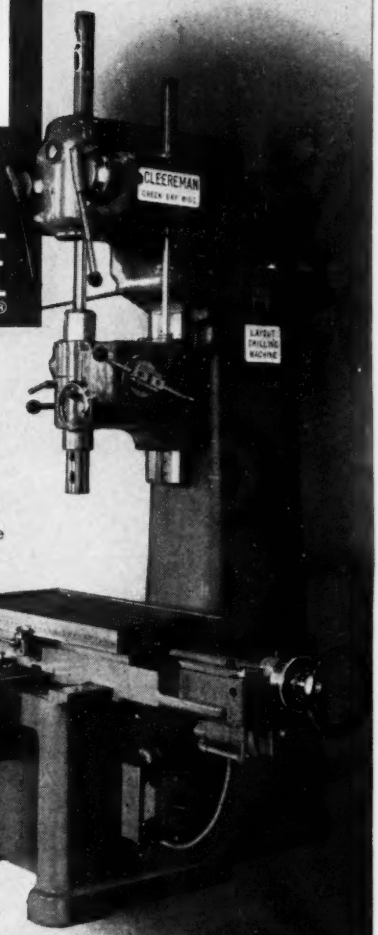

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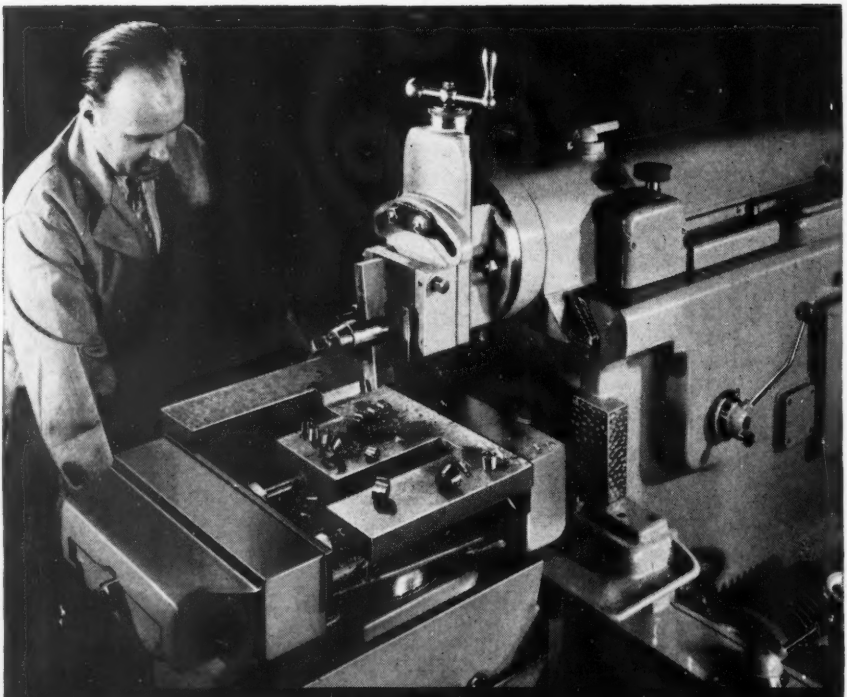

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SPECIFICATIONS
MODEL B

Capacity—5″ rounds, 10″ flats.
Height Overall—(Closed)—32″.
Blade Length—7′5″ x ½″ x 23 ga.
Floor Space—46″ x 28″.
Weight—(Uncrated) 235 lbs. Crated 280 lbs.
Boxed for Export 400 lbs.

Wheel Diameters—10″.
Motor—⅓ H.P. any voltage available.
Speeds—45, 90 and 150 ft. per min.
Casters—Optional at slight extra cost.

MODEL J, 10″ x 18″ CAPACITY ALSO AVAILABLE

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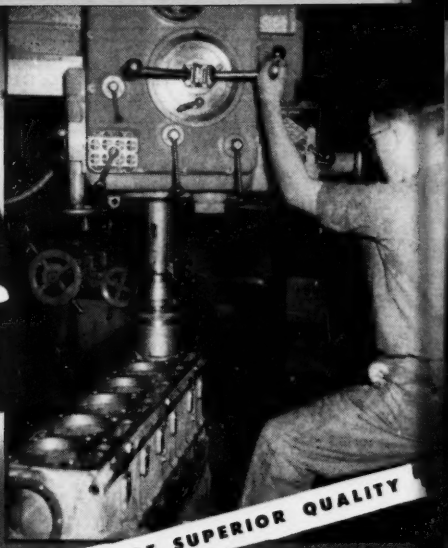

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REQUIRE SUPER QUALITY EQUIPMENT

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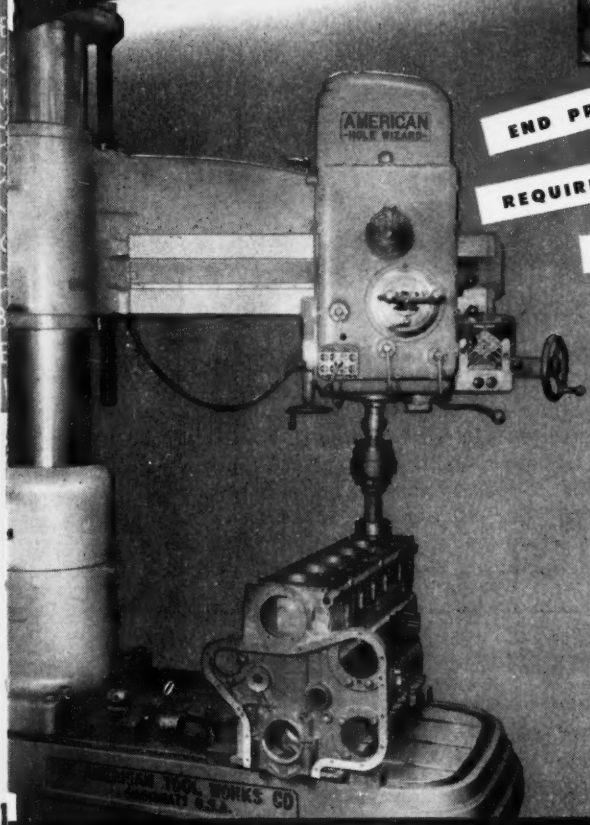

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The quality of "Cummins" products is universally recognized. We are proud indeed that so many "AMERICAN" Lathes and Radial Drills contribute to it.

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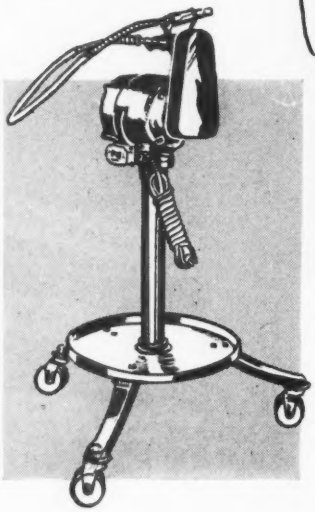

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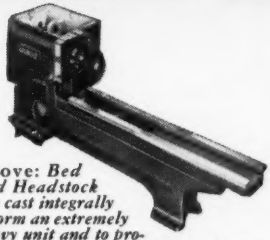
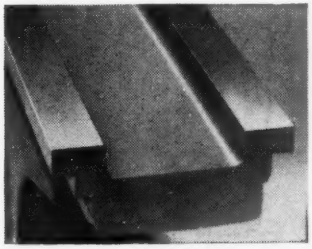


Above: *Bed and Headstock are cast integrally to form an extremely heavy unit and to provide the rigid foundation for all types of work.*

Below: *Block type ways are straddle keyed to the bed and ground in perfect alignment with the spindle. All working surfaces are hardened to 64-66 Rockwell "C".*



Here are two good reasons why you can count on the accuracy of Gisholt Turret Lathes—now and years from now.

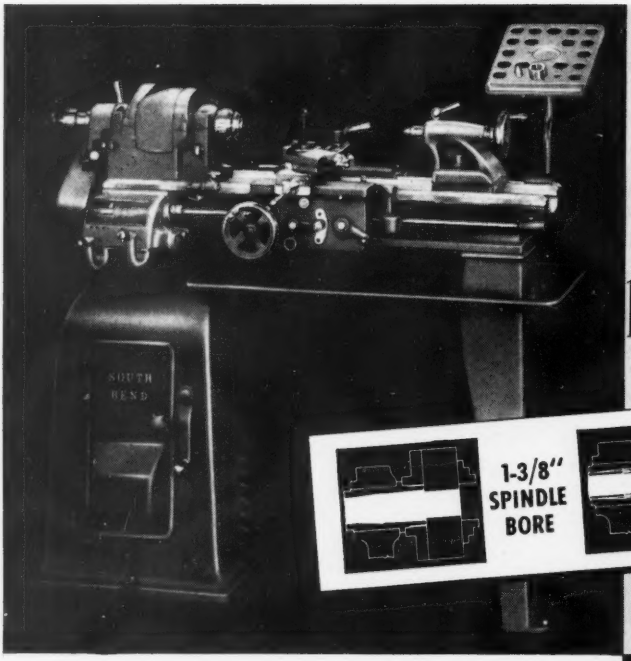
One-piece bed and headstock, cast as a heavy, rigid unit, reduce distortion and vibration to a minimum. Headstock is jig-bored to insure—and maintain—perfect alignment of spindle and drive shafts, with ample metal to provide the most solid support possible.

Hardened steel ways are augmented by hardened steel strips secured to the ram saddle, as well as hardened steel gibs and clamps, making an assembly that is virtually wear-proof. Its accuracy is further preserved by force lubrication.

These advantages are yours for the long life of any Gisholt Turret Lathe. Ask for complete details.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin



SOUTH BEND 10" Lathes

10" *Precision* TOOLROOM LATHE

Sound design, expert workmanship and quality materials give the 10" South Bend Lathe the dependable performance you want. Equipped with a precision lead screw, thread dial indicator and thread cutting stop, you can use it with confidence for cutting screw threads, making precision gauges or turning out instrument parts.

Another outstanding feature is the 1" collet capacity and 1-3/8" spindle bore which is built on the same design and specifications of larger lathes. The large spindle bore gives you big lathe collet capacity in a small, compact unit.

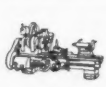
You will like the way this lathe cuts idle time . . . reduces costs . . . releases big lathes for heavy work. Write for catalog.

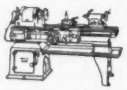
SPECIFICATIONS

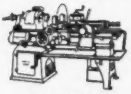
SWING 10⅛" over bed and saddle wings, 5¾" over cross slide.
COLLET CAPACITY.....1 in.
SPINDLE BORE.....1⅜ in.
BED LENGTHS 3, 3½, 4, 4½ ft.
CENTER DISTANCES.....14¼ to 34¾ inches.
SPINDLE SPEEDS (12) 50 to 1357 r.p.m., approximately.
POWER LONGITUDINAL FEEDS 48 R.H. or L.H. . .0015" to .0836"
POWER CROSS-FEEDS 48 . . . . .0006" to .0309"
THREAD CUTTING 48 R.H. or L.H. pitches, 4 to 224 per inch.

SEND INFORMATION CHECKED:

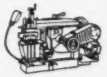
☐ _____
_____


☐ 9" and 10" BENCH LATHES


☐ 10" to 16-24" FLOOR LATHES


☐ ½" and 1" Collet TURRET LATHES

☐ 14" DRILL PRESSES


☐ 7" BENCH SHAPERS

Name_____ Company_____
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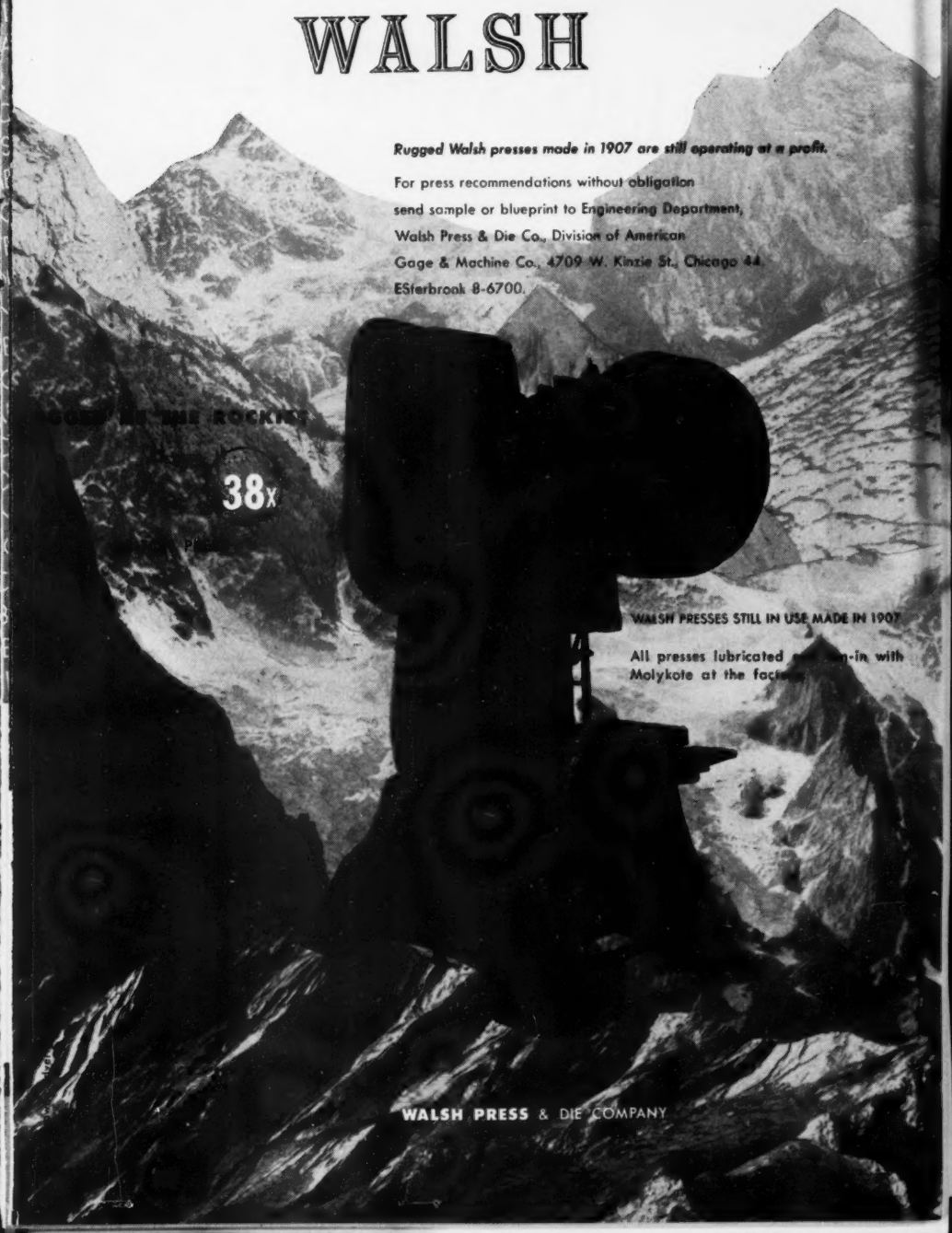
Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

WALSH



Rugged Walsh presses made in 1907 are still operating at a profit.

For press recommendations without obligation
send sample or blueprint to Engineering Department,
Walsh Press & Die Co., Division of American
Gage & Machine Co., 4709 W. Kinzie St., Chicago 44.
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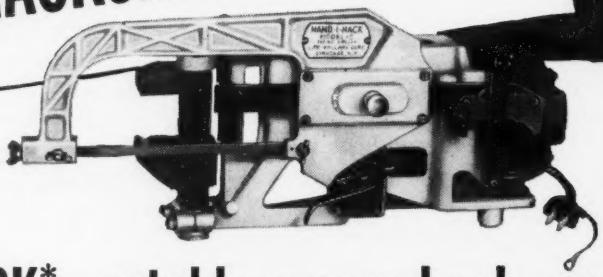
WALSH PRESSES STILL IN USE MADE IN 1907

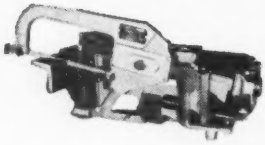
All presses lubricated [illegible]-in with
Molykote at the fac[illegible]

WALSH PRESS & DIE COMPANY

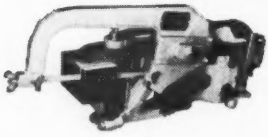
Stop HACKSAWING by Hand!



use HAND-I-HACK* portable power hack saw



Cuts at any angle up to 45°.



Cuts 3" square steel bar.

HAND-I-HACK eliminates the sweat and unproductive cost of manual hacksawing. Rugged—light in weight—Hand-I-Hack can be carried anywhere in the shop to cut bar stock, angle iron, flexible metal tubing, thin-wall tubing—even 4" I-beams.

Attached to the work, it saws in any position: horizontal, vertical, angular, *upside down*. One-quarter HP motor plugs into wall socket. Motors available for all standard circuits.

Cuts are accurate –saves stock. First cost is low —operating and upkeep cost negligible. Another saving: uses low-cost high speed *hand blades*.

● *Write for catalog and name of dealer.*

*T.M. Reg. U.S. Pat. Off.

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Manufacturers of Automotive Clutches and Machine Tools

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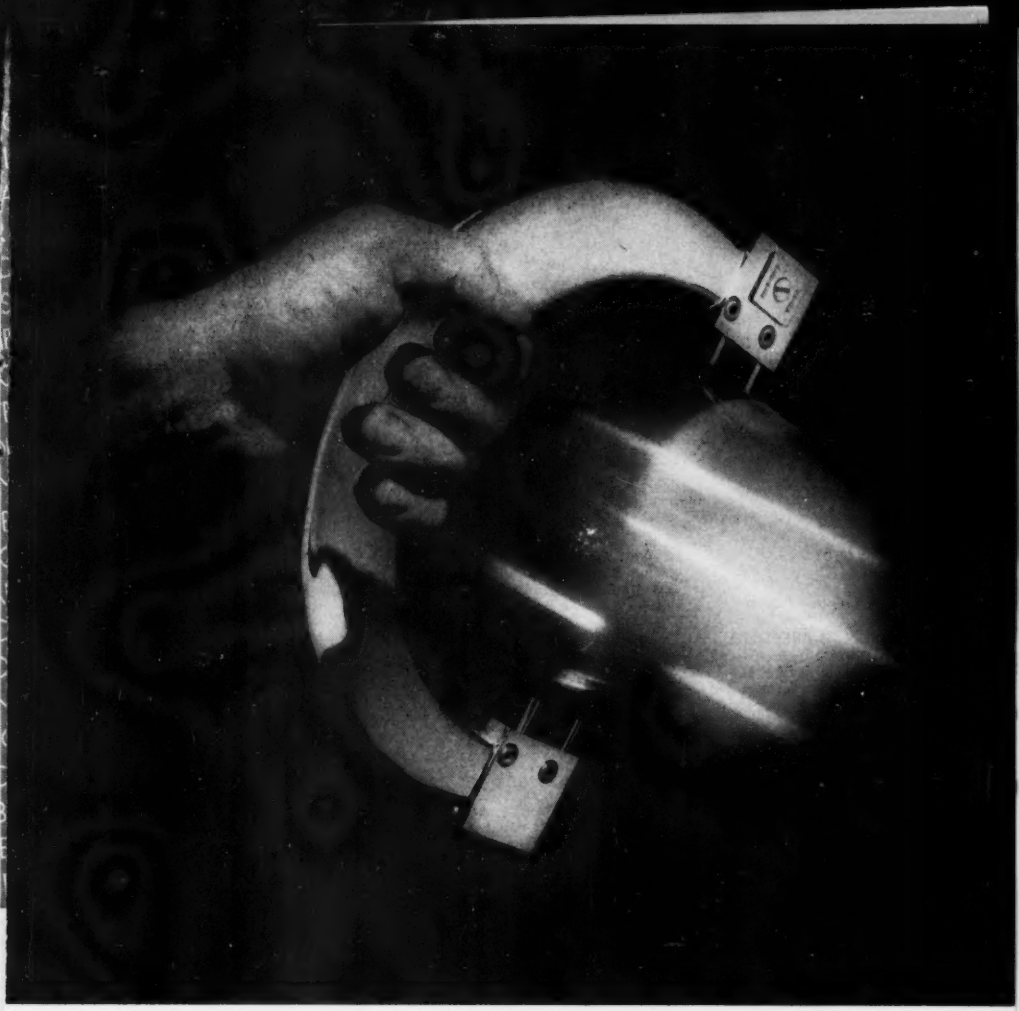

Measure with Confidence with Tumico

There was a time when "hair-line" accuracy was industry's critical standard of measurement. Today, Tumico instruments divide and redivide that mythical "hair-line" many times.

Tumico precision measuring tools are being used by a large segment of American industry. We cordially invite your inquiries on how to solve standard and special production measuring problems.

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The Land You Build On Requires Marking Devices

When measuring land areas or construction sites, surveyors mark boundaries with stakes or chalk. Working crews then can depend on these marking devices to insure dimensional limits and safeguarding of property rights.

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The Perfect Machine for Flat, Round and Contour Marking

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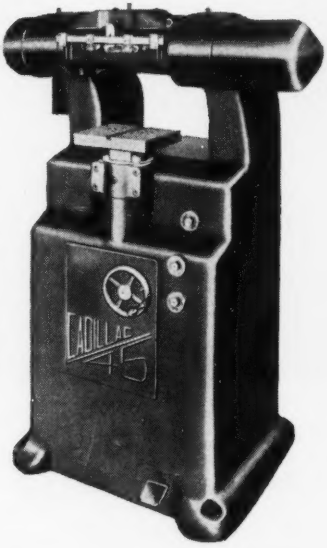
Faithfully reproduces and is particularly adapted to large production marking.

SOLID ROLL DIE
Assuring the utmost in accuracy—used in marking machines, lathes and screw machines.

ENGRAVED STEEL SEGMENT DIES
Segment die system ideal for stamping circular and flat work (trademarks, sizes, etc.).

Write for Bulletin SE-130

Compact, self-contained and manifold mounted, this machine gives full range of marking depth with one control from extremely shallow impression up to very deep impression. It will mark round, flat and irregular surfaces. Features: repeat action; capacity up to 110 one inch strokes per minute; up to 12,000 lbs. pressure.



For full information, write for Bulletin H-45

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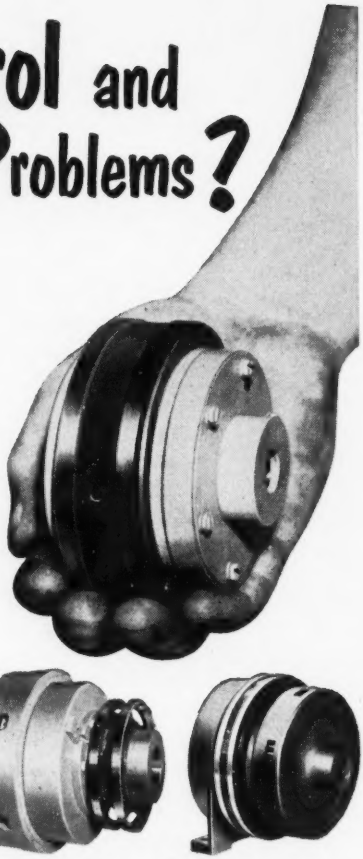
Engineering Sales Company, 112 Harwood St., Houston Tex. — 1905 South Harwood, Dallas Tex.

Power Control and Transmission Problems?

USE Stearns MAGNETIC CLUTCHES



If you have a problem of controlling machine operations and the source of power, be sure to investigate STEARNS Magnetic Clutches and Clutch-Brakes. Automatically controlled, they provide fast and smooth acceleration and disengagement. Having low inertia, they may be applied to a wide variety of jobs and are easily adapted to your machine requirements.

STEARNS Magnetic Clutches are simple friction devices, magnetically actuated, for split-shaft or through-shaft application. They are available in a number of styles and sizes ranging in torque from .4 lb. ft. to 30,000 lb. ft. STEARNS Magnetic Clutch-Brakes, a combination of a magnetic clutch and a spring-set magnetic brake, provide positive engagement, fast stopping, safe holding.

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FOR CUTTING ALL SHAPES... ALL TYPES OF METALS...

- Open construction for easy access.
- Microset stock stop for quick setting, precision sawing.
- ⅝"x.032 blade is easier to change, has handy tension take-up.
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- Plus 14 other important features.

FREE CATALOG!

For further details on Famco Band Saws see your nearest Famco Dealer, or write for illustrated catalog without obligation. Information on other Famco Cost-Cutting Machines will be furnished gladly.

USE A famco "612" METAL CUT-OFF BAND SAW

Here is a metal cut-off band saw engineered and built like a precision machine tool. It cuts all shapes, all types of metals up to 6" round and 6" x 12" rectangular. It is ruggedly built of semi-steel castings with guards of high quality aluminum castings. Steel components are of the finest alloys.

Careful attention to design and manufacture is a Famco "plus." Every possible convenience and safety precaution has been built into the Famco "612" to make it true to the Famco tradition for offering the highest quality machines at the lowest possible cost.

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ARBOR PRESSES • FOOT PRESSES • SQUARING SHEARS • AIR PRESSES
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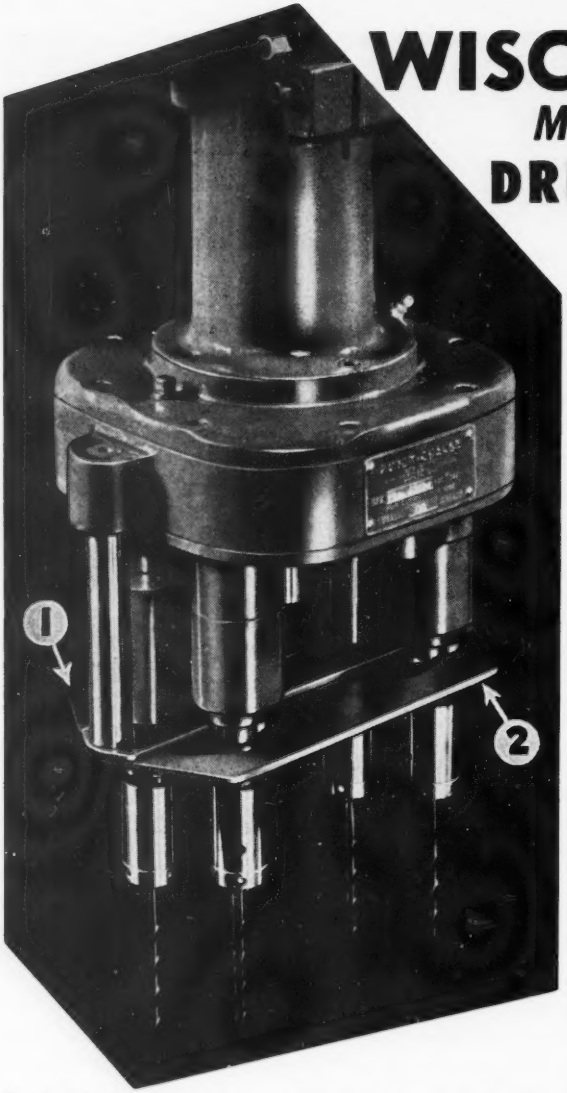

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Adjustable and Fixed-Spindle Types

Adjustable Spindle Heads have Dual Positioning Plates for fast, accurate set-ups that "stay put".

Positioning and Locking Templates are furnished for each bolt circle or hole pattern . . . to your exact specifications.

Half-hole Positioning Plates (1) make it easy to swing spindles into place quickly. Locking Plates (2), with full holes, are mounted on support posts to lock set-ups securely against shifting.

6 Capacity Ranges . . . from "Light Duty" to "Extra Heavy Duty". Standard Models have 2 to 8 spindles. Special Models built to order.

1. Half-hole Positioning Plate.

2. Locking Plate has full holes to hold spindles in place.

Send print of Hole Pattern for estimate.

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Since 1905 engineers and manufacturers of high-quality special cutting tools for the metal-working industry

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Choose from 3 styles, 4 Sizes-

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28 x 48 x 2 (4 legs)	28 x 72 x 2 (6 legs)
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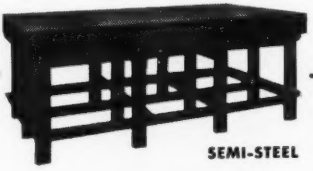

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The tougher the job, the greater the savings with this sensational new *unbreakable* blade. Its high-speed cutting edge electrically welded to a tough alloy back combines tremendous cutting power with resistance to shock and strain. It's safer, longer-lasting, more economical — shatterproof under the most rugged cutting conditions.

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Every day industry is finding new applications for these remarkable saws. They're unbreakable. Cut any machinable material. Sizes from ⅝" to 4½". Cut to 1⅛" depth in solid stock. Follow-through pattern permits cutting through partitions and to almost any depth in stacked material.

You get MORE CUTTING POWER

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There's only one way to prove a claim like that. Test Millers Falls saws yourself. Try them and see the results you get — in speed, accuracy, long life — compared with the saws you are now using. Then you'll know what Millers Falls never-ending research for better cutting designs, finer steels and more effective heat treating methods really mean in greater cutting power. In hundreds of plants where comparison tests have been run, Millers Falls saws are now standard. Write for full details on these money-saving saws — or, better yet, let us arrange a demonstration.

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BAND SAWS FOR EVERY MATERIAL AND EVERY JOB

Available cut and pre-welded to fit any make and model of machine. Packed in individual boxes for easy handling and storage — clearly marked for quick identification. Or, if you prefer, may be purchased in coils of 100 ft. and up.

INDIVIDUAL VULCANAIRE DUST COLLECTING UNITS

Are used on surface and other grinders where grinding dust must be removed.

Inexpensive, compact units, with no moving parts. Operated from your present air supply.

Installed in a few minutes, eliminating need for costly centrally located dust collecting systems.

The collector element is mounted on the side of the machine. Quickly cleaned, requiring no refills.

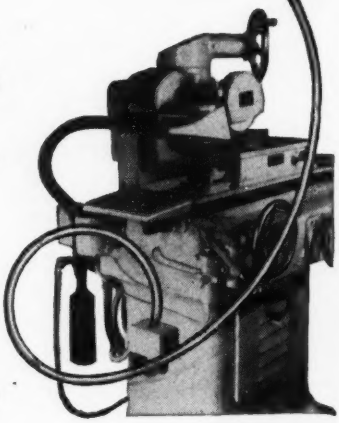
Vac-suction pick-up device (vacuum nozzle) is mounted on the grinding wheel guard or close to grinding wheel on other applications. This mounting permits constant contact with dust as the wheel is moved up or down.

A simple needle valve operates the unit, and can be shut off whenever the machine is not in use.

Available in two sizes: 700 series for grinding wheels 7″ dia. or less—200 series for wheels 2″ dia. or less.

Made by the makers of Vulcanaire *The* jig grinding attachment.

Write on your letterhead for "Dust Collector" Booklet.



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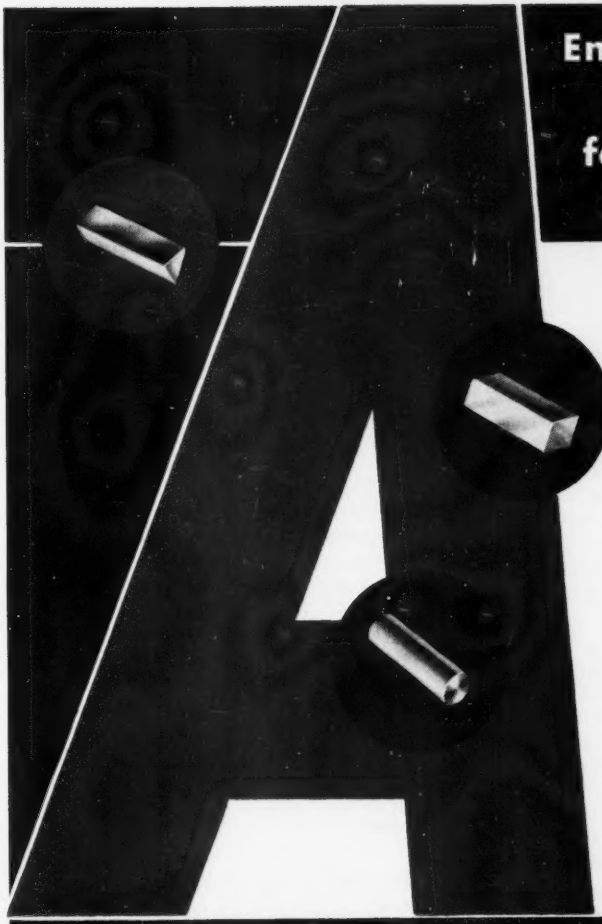

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over the editor's desk

Blazing a Trail

Our travels last month took us to the formal opening of the Norton Company's new $6 million Grinding Machine Division plant in Worcester where we were introduced to a pioneering method of machine tool manufacture. Here, in a single story plant, providing a factory area of some 222,000 square feet, machine tools are being built in straight-line production, somewhat akin to the production line methods employed in the automotive plants. We hesitate to draw a close comparison. however, for whereas the automotive people are concerned with one model for all practical purposes, the Norton straight-line production layout is designed to accommodate a total of 45 different types of precision grinding and lapping machines.

Considerable credit must be given to the Norton personnel who were in on the planning of this new plant for it undoubtedly will set the pattern for many machine tool plants to be built in the future. Materials handling has been reduced to a minimum through more efficient layout of machines. The latest in lighting systems provides an average of 40 foot-candles at the factory floor level. Forced ventilation provides three complete changes of air per hour. A completely modern cafeteria is equipped to handle nearly 400 people at one sitting.

Strangely enough, the new plant is located several hundred miles from the center of Norton's domestic market. Everett M. Hicks, vice president and manager of the Grinding Machine Division, gave the answer to this seemingly unusual situation—a large proportion of workers have been with the company for 25 or more years plus the fact that most of them are highly skilled craftsmen who would be difficult to replace if the plant had been built in some other area.

It is encouraging indeed during these uncertain days to find many organizations aggressively planning for the future. We feel that their efforts today will be more than amply rewarded in the years ahead.

Future Looks Light

Those who visited the First International Magnesium Exposition at the National Guard Armory in Washington, D. C., last month could not help but be impressed by the great strides being made in applications of magnesium. We find a logical reason for this unusual growth. While we are depleting sources of many other metals, the supply or magnesium remains almost unlimited. At present, the experts tell us that a sufficient amount of magnesium exists in the oceans to cover the entire earth's surface to a depth of nine feet. The source of magnesium is as inex-

haustible as the sea itself.

The biggest chunk or magnesium production in this country is going into the transportation field for aircraft, trucks, trailers and passenger cars. A 16-foot airplane wing section, believed to be the largest cast aircraft surface ever produced, was on display. And, pointing toward possible applications in this country, was an all-magnesium autobody weighing only 132 pounds exhibited by a British manufacturer.

The trend toward more widespread use of magnesium in household utensils and appliances, all featuring minimum weight with maximum durability, was clearly evident at the Exposition. In addition, hundreds of applications of magnesium to defense needs were also shown.

With an increase of nearly 2,000 per cent in magnesium consumption by 1975 predicted, it is inevitable that magnesium will find its way into our lives in many ways in the near future.

"I would appreciate it, Miss Steerman, if you wouldn't file your lunch under machine shop contracts!"

GIVES YOU *EXCLUSIVE* ADVANTAGES IN CUTTING OFF STOCK FAST AND *ACCURATELY*

Fast, burrless cut-off of shapes and tubes up to 30" round. Let M & M Triple-Chip saw blades give you the higher *production-with-accuracy* which Industry must attain and maintain. Ask your dealer.

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Triple-Chip METHOD

REMEMBER—IT'S THE COST PER CUT THAT COUNTS!

Only M & M builds ALL 3: CIRCULAR SAW, SAW BLADE, BLADE GRINDER

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WRENCHES

Choose Your Wrenches as you do your friends--for life

Specify ARMSTRONG Wrenches for lifetime service, for finely balanced tools that feel right in the hand and make work easier, faster and less fatiguing. ARMSTRONG Wrenches generally are longer for size—give greater leverage. Accurately milled or broached openings give the proper clearance. They are safe wrenches because they are strong beyond need.

Drop forged and machined from high tensile carbon or special alloy tool steels, ARMSTRONG Wrenches are heat treated, tempered and tested to an exact balance of toughness, hardness and tensile strength. Each is beautiful in finish and line, is a quality tool to be proudly possessed by any mechanic—or certain to "give a lift" to any assembly line. Buy wrenches which carry the trade marks HI-TEN or ARMALOY. On carbon or alloy steel wrenches these trade marks are your guarantee of lifetime quality

WRITE FOR CATALOG

ARMSTRONG BROS. TOOL CO. *"The Tool Holder People"*
5228 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

MODERN
Machine Shop

features in this issue

Vol. 25, No. 12
MAY, 1953

Solving Stainless Steel Fabricating Problems, Part I — ***By Lester F. Spencer***

This is the first of two articles in a series in which the author describes some of his own personal experiences in dealing with fabricating stainless steels at the Landers Frary & Clark plant. Page 126.

Diversifying the Use of the Taper Pin, Part II — ***By Fred Rogers***

In this article the author concludes his discussion of various applications of taper pins and also makes a comparison of the American classification system with that of the British and German systems. Page 136.

Radio Speeds Drop Hammer Die Handling — ***By Gilbert C. Close***

The author tells how an aircraft plant utilizes a two-way radio communication system to provide close contact between outdoor die handling lift trucks and the drop hammer die department. Page 154.

Getting Out Increased Production — ***By Alfred M. Cooper***

In this article the author explains why increased production depends more upon good day-by-day supervision on the job than on any other single element of management. Page 158.

Complete Nacelle Fabricated From Titanium — ***By Ira S. Roberts***

This article describes one of the first complete structures to be made entirely of titanium. Page 170.

How Does Your Work Conform to Specifications? — ***By C. W. Kennedy***

The author points out a number of workpieces which may be machined exactly to blueprint specifications and yet are unfit for assembly purposes. Page 174.

How to Handle Shop Grievances — ***By Robley D. Stevens***

In this article the author explains how the recent growth of industrial organizations has placed emphasis on the foreman in solving employee disputes. Page 192.

Case History No. 4—Machining Stainless Steel — ***By G. J. Stevens***

The author describes the methods of overcoming problems encountered in machining small tapered needle valves and valve sets. Page 204.

What Tool Engineers Discussed in Detroit

A section devoted to the highlights of the papers which were delivered at the recent meeting of the American Society of Tool Engineers. Page 206.

Solving Stainless Steel Fabricating Problems, Part I . . .

By Lester F. Spencer*

In which the author speaks from his own experience in working with the stainless steels.

THE more commonly used group within the stainless steel catagory are those compositions identified as the 'austenitic' grades, a group having balanced additions of carbon, chromium and nickel. Due to the restriction of the nickel bearing stainless for the consumer trade, many manufacturers have, of necessity, used the straight chromium stainless compositions A.I.S.I. types 410 and 430. In reference to Table 1, the more commonly used austenitic grades are listed along with their chemical composition and mechanical properties that can be expected within the annealed sheet or strip product. This listing, by no means, approaches the available analyses for commercial use since there are over thirty-five individual compositions available from which to choose.

However, discussion in this article will be limited to those compositions listed. The austenitic alloys, as represented by the '300' group in an A.I.S.I. identification, are non-magnetic in the annealed condition and cannot be hardened by the standard heat and quench procedure employed for the plain carbon and lower alloy steels. However, these compositions will cold work to a remarkably high degree of hardness, a phenomena which becomes very apparent in the press working of these materials and necessitates the use of intermediate annealing procedures to obtain successful working to the final shape. The ductility of this group is quite remarkable; this fact enabling reductions as high as 50 per cent within a drawn shell made from an analysis such as type 302 before annealing is required. In some instances, especially in a composition which has a remarkably low rate of work hardening, the reduction figure cited above can be exceeded before annealing is required.

As has been intimated, a variety of cold forming ability exists within the various compositions listed within the austenitic group, a fact governed by the rate of work hardening which is largely determined by the ratio of nickel to chromium within the specific anlysis. This fact is clearly brought to the reader's attention in the paragraphs to follow.

A.I.S.I. Type 301 has a nominal ratio of chromium to nickel of about 17 to 7; this material type having a relatively high rate of work hardening. Thus, it has been our experience that this material will perform ideally where moderate forming and drawing opera-

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tions are encountered, the finish section preferably being completed in the initial drawing. Attempting the succeeding draws or forming operations on type 301, even with the use of an intermediate anneal, has proven quite costly since a high percentage of breakage had been experienced. Although subsequent operations such as beading, flanging, and so on, had been performed successfully, extreme care had to be taken not only as to operational technique, but also to assure that the part had a complete anneal. This alloy type is well known for its high strength values obtainable on a cold-worked structure, this strength being realized either by press working or by cold rolling to various tempers. We have found that this alloy type will also 'wrinkle' to a greater degree as compared to the other austenitic compositions. In addition, the difficulties experienced will tend to increase as the nickel deviates downward from the normal nominal seven per cent as indicated by a specification.

A.I.S.I. type 302 is the more commonly used austenitic alloy for press working. It is being used for both deep drawing and spinning operations. The layman or press operator reference to the '18-8' or the 'chrome-nickel' alloy will usually connote to the type 302 composition. As mentioned previously, this alloy type has a lower rate of work hardening than that exhibited by type 301 with the result that reductions up to fifty per cent can be realized before an anneal may be required.

The composition as represented by A.I.S.I. type 304 has very similar working properties to that displayed by type 302. Due to the lower carbon content within this alloy type, it is used for material which should be welded and still retain a good corrosion resistance. As will be discussed later in the paper, the lower carbon content will minimize intergranular carbides, the major source of loss in corrosion resistance of a welded product. It is chosen over the stabilized grades, types 347 and 321, due to its lower costs and better fabricating properties. In some structures, the welded product can be placed directly into service without the benefit of a corrective anneal.

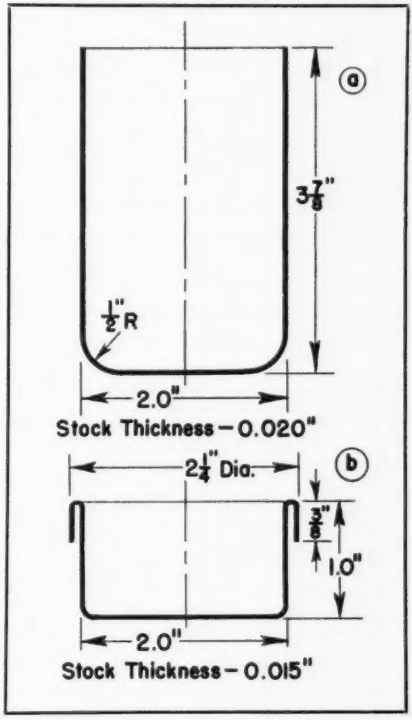


Fig. 1—Sketches herewith illustrate examples of workpiece in which savings were effected by use of Type 305 stainless.

Of relatively recent interest is the development and application of A.I.S.I. type 305 which has an analysis ratio of

Table I

	A.I.S.I. Types								
	301	302	304	305	316	321	347	410	430
Chemical Analysis, Per Cent									
Chromium	16/18	17/19	18/20	17/19	16/18	17/19	17/19	11.5/13.5	14/8
Nickel	6/8	8/10	8/11	10/13	10/14	8/11	9/12	.....	.....
Molybdenum	.....	.....	.....	.....	2/3	.....	.....	.....	.....
Columbium	.....	.....	.....	.....	.....	.....	10xC min.	.....	.....
Titanium	.....	.....	.....	.....	.....	5xC min.	.....	.....	.....
Carbon	Over 0.08/0.20	Over 0.08/0.20	0.08 Max.	0.12 Max.	0.10 Max.	0.08 Max.	0.08 Max.	0.15 Max.	0.12 Max.
Manganese	2 Max.	2 Max.	2 Max.	2 Max.	2 Max.	2 Max.	2 Max.	1 Max.	1 Max.
Silicon	1 Max.	1 Max.	1 Max.	1 Max.	1 Max.	1 Max.	1 Max.	1 Max.	1 Max.
Mechanical Properties, Annealed**									
Ultimate Strength, psi	100,000	80,000	80,000	75,000	75,000	75,000	80,000	60,000	60,000
Yield Strength, psi*	35,000	30,000	30,000	25,000	30,000	30,000	30,000	32,000	35,000
Elongation, % in 2 in.	50.0	50.0	50.0	50.0	40.0	40.0	40.0	20.0	20.0
Reduction in Area, %	60.0	60.0	60.0	60.0	50.0	50.0	50.0	50.0	40.0
Hardness, Brinell	180 Max.	180 Max.	180 Max.	180 Max.	200 Max.	200 Max.	200 Max.	200 Max.	200 Max.
Hardness, "B" Rockwell	90 Max.	90 Max.	90 Max.	90 Max.	95 Max.	95 Max.	95 Max.	95 Max.	95 Max.
Izod Inpact, ft. lbs.	85	85	85	85	70	80	80	85	3/85
Heat Resistance									
Maximum Operating Temp.									
Intermittent Service	1600 F.	1600 F.	1600 F.	1600 F.	1600 F.	1600 F.	1600 F.	1500 F.	1600 F.
Continuous Service	1700 F.	1700 F.	1700 F.	1700 F.	1700 F.	1700 F.	1700 F.	1300 F.	1500 F.

* 2% oddset.

**Minimum values unless otherwise specified. Note: Data in this Table furnished by The Carpenter Steel Company.

Nominal Chemical Composition and Some Properties of the More Commonly Used Press Working Alloys.

chromium to nickel of approximately 18 to 11.5 and, in some instances, 18 to 14. This analysis has a lower rate of work hardening than that exhibited by type 302 and as a result, it has initially been introduced as a 'free spinning' grade. Our work in deep drawing of this composition type has been quite successful and many material specifications will be changed when this material is again commercially available for consumer use. This success can be aptly illustrated by several case histories in which a production run of several hundred pieces were made.

In Fig. 1a a shell such as illustrated had been previously produced from 0.020 inch type 302 material. The application of type 305 resulted in the elimination of two anneals and the subsequent costly pickling operations. Thus, the savings realized in the elimination of the above operations resulted in a total of $3.50 per hundred. The cost of the 305 composition was $1.53 per hundred above that realized for type 302 which gave a net savings of $1.97 per hundred. Spinning operations followed deep drawing; however, it was necessary to have an anneal prior to this operation. Calculation of reductions realized by the use of type 305 stainless was approximately 72.0 per cent.

The item as represented in Fig. 1b was also formerly made from type 302 stainless and, as in the preceding illustration, two anneals along with the subsequent pickling operations had been eliminated. Thus, this part was made to completion without the use of any annealing with a reduction of approximately 55.0 per cent being realized during the drawing sequence. In addition, the beading was performed with success. The savings realized by the use of the elimination of operations was $3.20 per hundred. The additional cost of material above that of type 302 stainless was $0.35 per hundred which netted a savings of $2.85 per hundred.

Another sequence in which type 305 was used with considerable success was a drawn part very similar to that illustrated in Fig. 1b with the exception that the item was larger. Here again the part was produced to the completed form without the use of subsequent anneals with a reduction of approximately 60.0 per cent being realized during the drawing sequence. In addition, a bead was made. In the elimination of two anneals and subsequent pickling, the savings realized was $2.10 per hundred. The material cost, in this specific instance, was $1.20 per hundred which left a net savings of $0.90 per hundred.

The success experienced in the forming of type 305 stainless, in spite of the higher cost of material, is food for thought. Thus, an extensive program had been planned to extend this investigation over a large variety of drawn and spun component parts; however, this has been temporarily delayed due to the difficulty in obtaining nickel bearing stainless steels. It had also been concluded that the savings as indicated above could be greater since the test runs were on the basis of tools to form type 302 stainless. Thus, it is apparent that, in some instances, a two draw operation may be combined in a single draw.

It should be realized that a finished drawn shell, which has been fabricated from type 305 stainless without the benefit of annealing between operations, will usually be in a highly stressed condition. This condition is particularly evident where high reductions

are realized. If a subsequent operation involves an application of heat such as silver brazing, difficulty in breakage may occur within the shell. Thus, on a part similar to that illustrated in Fig. 1b, which had been produced without anneals from type 305, the use of a silver brazing procedure realized a breakage of approximately 32 per cent. This was remedied by the use of an induction anneal on the top of the shell which relieved all stress working. A subsequent beading operation proved insufficient in producing stress concentrations to cause breakage in the brazing operation. On other shells of similar design, a soft soldering operation had been performed. However, in this instance, the temperature realized during this operation was insufficient to cause breakage. In the former instance, induction silver brazing involved a temperature of approximately 1350 degrees Fahr., whereas in the soft soldering operation, the temperature realized is around 525 degrees Fahr.

The composition represented by A.I.S.I. 316 has molybdenum in addition to the standard nickel and chromium alloying additions. The analysis, therefore, provides higher resistance to chemical attack than that exhibited by the previously discussed analysis. In addition, type 316 possesses higher creep, stress-to-rupture and tensile strength at elevated temperatures than any other stainless steels. Within the stainless group, there is another type which is not listed that is similar to type 316. This, type 317 stainless has a molybdenum content from 3.0 to 4.0 per cent and also provides excellent corrosion resistance.

Both stainless types 321 and 347 are used for components which are intermittently heated and cooled to temperatures between 800 and 1650 degrees Fahr. These compositions are normally referred to as the 'stabilized' grades, developed to eliminate carbide precipitation and consequently intergranular corrosion. Both titanium and columbium are known to be strong carbide formers. In the analyses which do not contain these carbide forming elements, an operation such as welding will cause the carbon to unite with the chromium to form a chromium carbide. The resulting loss of corrosion resistance experienced is attributed to the continuous network at the grain boundaries. This condition is illustrated in Fig. 2 and the loss of corrosion resistance can be aptly illustrated in both Fig. 2 and Fig. 3 which show the appearance of the material after it had been pickled in a ferrisul-hydrofluoric acid bath for the removal of scale. Notice that 'grains' are actually removed during pickling which would support the thesis that corrosion is intergranular in nature.

In the event that either of the stabilized grades of stainless are employed, these carbide formers would have a stronger affinity for carbon than for chromium. As a result, either titanium or columbium carbide will form in the temperature range of 800 to 1650 degrees Fahr. which will be dispersed at random throughout the entire grain and also, leaving the chromium in solution to give the necessary corrosion resistance. Although both compositions are commercially used, stainless type 347, having the columbium addition, is primarily employed where fusion welding is within the operational procedure. This is due to the fact that columbium is retained during the welding process. In some instances, tantalum can replace a portion of the columbium with-

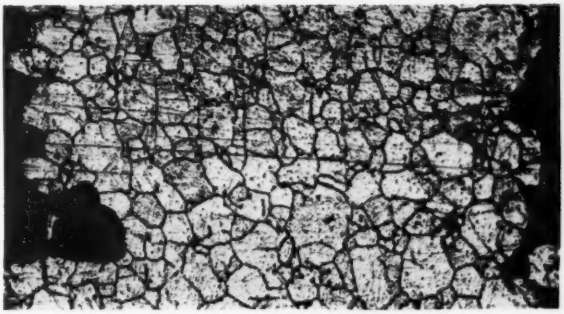


Fig. 2—Intergranular condition in the Type 302 stainless. Notice separations between grains at outer edge. This condition is caused by the corrosive action of the pickling solution used in removing scale.

in an analysis; however, the combined amount of both tantalum and columbium is still ten times the carbon content as the minimum.

A.I.S.I. type 410 is within an entirely different class than the previously discussed austenitic alloys. It is a material known as the 'martensitic' type alloy. Thus, alloys within this group are hardenable by the standard heat and quench procedure. As a press working alloy, type 410 can be used for limited forming, the ductility of the material being quite low.

As previously mentioned, more attention is given to A.I.S.I. type 430 stainless, an alloy known as a 'ferritic' type having chromium as the majoring alloying element. It is a material which can be cold worked in such operations as drawing, stamping and forming; however, its ductility, as compared to the austenitic grade type 302, is quite lower. Thus, in a sequence of operations in which type 430 is used as a substitute for type 302, the completed item can be produced; however, the number of drawing sequences along with the total amount of inter-spaced anneals must be increased. Even though type 430 stainless is less expensive, in some instances, it may be found that the cost of producing a unit part will be more expensive than when produced with type 302 stainless, due to the added operational steps required to produce the part from 430 stainless. This would, of course, be dependent upon the specific design of the part and the specific operational sequence.

In most instances, especially in the production of either round or rectangular deep drawn sections, an evaluation of the material should be made prior to its entry into production. This has been one of the objectives at LF&C and one of the more successful methods, through experience, has indicated that the Olson or Erickson cup test can predict fairly consistently the drawability of stock. This test procedure is also used to provide a comparison between type 302 and type 430 stainless where the latter is to be used as a substitute material. Of interest are the values that are received from both 430 and 302 stainless as compared to a low carbon drawing grade and an extra deep drawing carbon steel. These values, as indicated in Table II, illus-

Table II

Material Type	Nominal Cup Values
Stainless, Type 302	0.440 inch
Stainless, Type 430	0.295 inch
Commercial Drawing Quality, Low Carbon Steel	0.360 inch
Extra Deep Drawing Low Carbon Steel	0.395 inch

trate the remarkable ductility of type 302 stainless in comparison to both drawing grades of steel. The percentage figures indicate approximately a 32 per cent better ductility than stainless type 430, a 20 per cent better ductility than commercial drawing grade, low carbon, and a 14 per cent better ductility than the extra deep drawing low carbon.

Finish

The subject of finish often enters the problem in selection of material. Thus, the question—"How can one determine the finish required on stainless for any specific application?" This would depend upon the type forming that is done and the extent of this forming. Thus, in the production of deep draws, it has been our practice to specify a No. 1 finish which is defined as 'hot rolled, annealed and pickled'. The reason for this selection is that the roughness of surface exhibited by this finish will aid in the retention of lubricant, which is so necessary to prevent metal-to-metal contact. However, it has been brought to the attention of the writer that the No. 2D matte finish will perform equally as well. At this point, the experimental lot has not gone through fabrication to determine the validity of this statement.

It should be remembered that a luster finish will be destroyed upon annealing unless a clean, bright anneal is employed. With this in mind there is very little advantage in diverting from the No. 1 finish.

In the event that a product will require subsequent polishing operations, the use of a luster finish is recommended. In this case it has been our practice to specify a No. 2D, smooth dull cold rolled finish, on moderate draws. On light drawing operations and forming, the No. 2B finish can be used. Needless to state, the difficulties in regard to protection of finish increases as the luster of the incoming material increases. Thus, on either the No. 4 or the No. 6 finish, special protection must be instituted to protect this finish during fabrication. These finishes are usually restricted to light forming operations.

Press Operations

Shearing, Punching and Perforating—Strict observance of clearance and the adjustment of the cutting edges is a prerequisite in the shearing of the stainless steels. In the shearing of the austenitic alloys, the metal must be cut completely through its entire thickness. This shearing action varies with that experienced with other materials in that it will not snap or break after partial cutting. The shearing action experienced with the straight chromium stainless steels is very similar to that experienced with the carbon and lower alloy compositions in that cutting action extends to a certain portion after which there is a 'break-through' through the remainder of the stock thickness.

Clearance values usually given for the austenitic group is from 10 to 15 per cent of the thickness of stock to be sheared; however, it may be found that the value given may vary in accordance to specific operating conditions. The straight chromium steels utilize about the same clearances that are employed in shearing the plain carbon steels. Due to the high strength characteristics of these highly alloyed materials, approximately twice the power capacity is required than that employed for the ordinary steels. In addition, it should be remembered that the austenitic

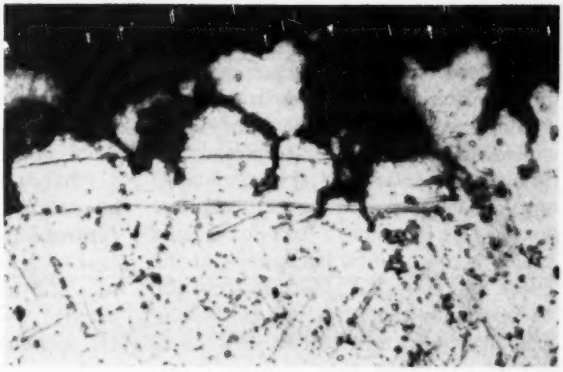


Fig. 3—Enlargement of edge condition. Section indicating loose grains of metal.

grades will work harden and if conditions of operation will promote this work hardening action, the power required for shearing will increase proportionally. Also, especially with the austenitic grades, if the cutters are not ground regularly to a keen cutting edge and maintained as such, the dullness of the edges will have a tendency to considerable camber and burr.

All of the stainless compositions have a tendency to gall, or pick-up on the tools, a condition which may be reduced or even eliminated by properly mating the tools in question. A practice frequently followed is to allow very little clearance between the punch and the die in an operation such as blanking; then if it is too close, relieve the punch until the correct tolerance is obtained for the job. Evidence of too little clearance is the early tendency for the punch to gall or pick-up. Too much clearance will result in excessive burrs and a drawing action along the edge of the cut.

The importance of burred edges on either blanked or sheared stock cannot be over-emphasized. This is especially true in the austenitic grades where these burrs may have a high hardness. Thus, the burrs may be hardened to such as extent that in passing over the die ring, unless the dies are extremely hard, the surface of the dies may be scratched to a considerable extent. In addition, burrs may retard metal flow between the draw ring and the pressure hold down pad in a subsequent operation such as deep drawing. In instances where a considerable burr is present, it may be advisable to break the burr with a file before proceeding with subsequent operations. Grinding the edge may also effectively remove these burrs. The heat of grinding may prove beneficial to soften the previously hardened edge.

Although detailed information on blank lay-out will not be given, it can be stated that this phase is of extreme importance in the economical use of either sheet or strip. This is particularly true in the fabrication of the stainless steels due to the relatively high cost of these alloys. In this type operation, the die member is made to size whereas the clearance is taken off the punch. The punch face is usually ground flat, and to reduce the shearing force to blank an austenitic stainless, a shear may be ground on the die component. Again, the subject of clearance may vary in individual cases; however, an empirical value that can be used as a starting point is approximately 10 per cent the thickness of stock.

In an operational sequence involving drawing operations, the inclusion of operations such as blanking and cupping is often incorporated. In many instances, we have found that the use of coiled material to be quite economical in either the blanking or in the blanking and cupping of thin gauge material. In this instance, a decoiler is used which is placed directly in back of the press. The material is passed from the decoiler into a shallow pan containing the lubricant and then into rollers to evenly distribute the lubricant, after which it is fed into the press for the operational sequence. In the use of his procedure, observance as to coil size must be made so as to conform with the ability of handling within the individual plant. The use of cut lengths of either sheet or strip can also be employed, this usually being the case where the heavier gages are to be blanked or where the specific conditions of succeeding operations will not permit a combined blank and cup operation.

In a punching operation, the die is usually ground flat so as to prevent distortion while any shear required is ground on the punch. Both punching and blanking may be incorporated within a single press stroke especially on small size parts. With closely grouped holes, it is advisable to employ step punches so as to reduce the power factor and to minimize distortion. Considerable difficulty may be experienced when proper punch design is not observed. This is particularly true in the punching of small diameter holes where the ratio of punch height to punch diameter is quite large. In addition, liberal fillet design and sweeps connecting cross sectional changes along with ample clearances should be observed. As in the shearing operation, those operations such as blanking, punching and perforating should employ slow press speeds, sharp tools and have ample press power.

Perforating, or punching of many identical holes within a sheet or a formed part, is usually a secondary operation which is frequently performed by a multiple punch method. The limits usually recommended in perforating the austenitic stainless steels is given as 1½ to 2 times the metal thickness. Thus, a hole diameter above the value specified will permit the use of the perforating operation. Hole diameters below the value given precludes drilling operations. In the event that the straight chromium stainless compositions are to be perforated, the limiting diameter would be to that equal to the thickness of metal.

Engineering Manufacturing Methods. By Gilbert S. Schaller. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. 613 pages. Illustrated. Cloth binding, board covers. Price, $7.00.

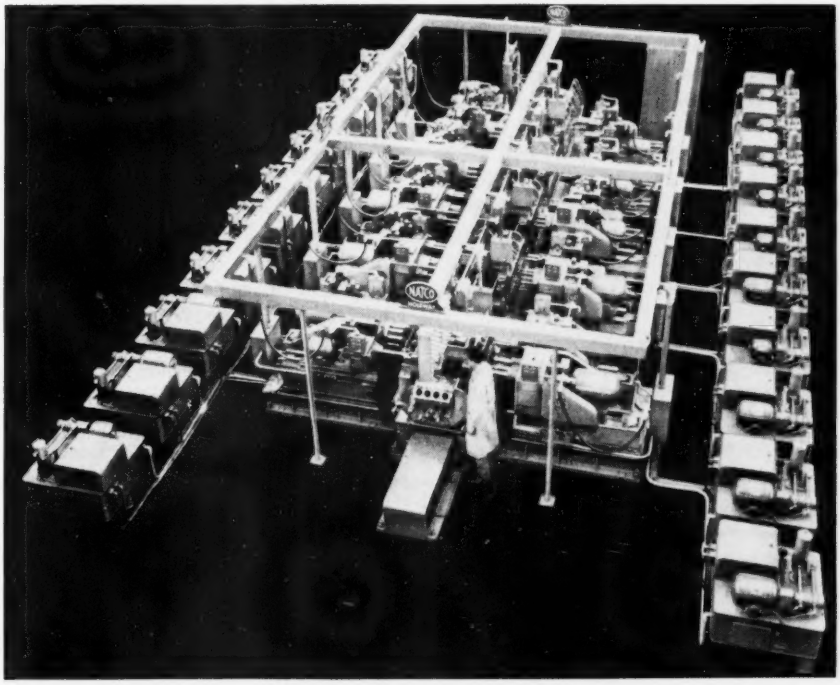
An unusually well-rounded presentation of current engineering manufacturing, this text integrates manufacturing methods into the engineering educational program through the use and correlation of engineering design, material and production standards, and codes in discussions. Manufacturing methods are presented as a vital part of engineering manufacture, not merely as an isolated subject. Utilizing an engineering approach, the book is based on fundamentals and offers a comprehensive survey of the field. In-

cluded in this treatment is an extensive discussion of economic aspects of engineering manufacture, showing the importance of modern manufacturing thinking where costs predominate, and the availability of alternate methods in solutions of given problems.

All major aspects of engineering manufacture are presented—founding, machining, welding, hot and cold shaping, thermal treatment, and engineering materials—as well as a special emphasis on the latest technological developments. Going further than the usual treatment of iron and steel materials, this volume covers light metals, plastics, and copper-base alloys as well.

Automatic Processing Machine with Mobile Hydraulic Power Units

THIS Natco "Holeway" Automatic Processing Machine, manufactured by National Automatic Tool Co., Richmond, Ind., incorporates mobile hydraulic power units to provide for fast replacement and to minimize down time. In addition, the arrangement of the power units permits quick accessibility for adjustment or repair. Production on this machine is approximately 100 parts per hour. In completes 102 operations automatically on each engine block in 6/10 of a minute, including drilling, combination core drilling and counterboring, chamfering, combination reaming and chamfering, and combination reaming and counterboring, trepanning and reaming.



Diversifying the Use of the Taper Pin, Part II

By Fred Rogers

Concluding a discussion on the application of taper pins, including a comparison of the American system with that of the British and German standards.

THE British standard for taper pins is similiar to the American system in that the taper per foot is ¼ inch and the large diameter designates the size of the pin. However there are two differences. While the American system contains some fractional and some odd decimal dimensions at the large end of the pins, the British system is wholly fractional. Theirs starts at 1/16 and ends at 5/8 as follows: 1/16, 5/64, 3/32, 7/64, 1/8, 5/32, 3/16, 7/32, 1/4, 9/32, 5/16, 11/32, 3/8, 7/16, 1/2, 9/16 and 5/8 inches at the large end. Our largest diameter of standard pin is .706 in. or .081 in. greater than their largest pin.

One other notable difference between the two systems is that they have what they call a "split" pin as well as a "solid" pin. The small end of the pin is split or slotted for approximately ¼ the length at the small diameter end, as shown in Fig. 23. This slot is present for retention purposes. Once the pin is assembled, the protruding small end can be parted as shown in Fig. 24. When a pin is so assembled, it is almost impossible to loosen enough so that it will fall out of the hole by itself. However, the material of which the pin is made has enough ductility that it can be squeezed together and the pin removed. If the ends, which must be capable of being bent back more than 90 deg., are not parted too much, the pin may be disassembled simply by hammering the small end, the parted end closing as the pin is forced out.

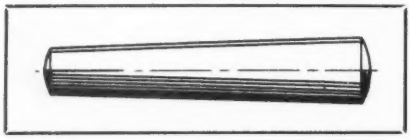


Fig. 23—Drawing of taper pin having small end slotted.

Fig. 24 — Drawing showing ordinary method of obtaining retention with slotted taper pin.

While the slot is provided so that the ends can be parted, as in Fig. 24, the ends have also been displaced as shown in Fig. 25. Instead of prying apart, the ends are bent parallel to the

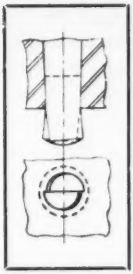


Fig. 25 — Drawing showing method of obtaining retention with slotted taper pin when ends are bent parallel to the slot.

slot. Shown exaggerated in the latter view, it is only necessary to knock the ends out of line several thousandths of an inch. This method is suggested for use on small diameter pins only.

The British standard contains many more pins than our own. We have 107 while they have 174 different diameters and lengths. We have 17 diameters, the same number as they have. Lengths start at ½ in. and advance in increments of ¼ in. to 3½ in. and from 3½ in. to 6 in. they vary in ½ in. increments. All of the 174 sizes are available as "solid" pins (without the slot). About 68 per cent of these 174 can also be obtained "split". Sizes containing the slot are available in selected diameters from ⅛ in. upwards except in the 9/32 and 11/32 sizes which are "solid" only. Therefore, in the British standard setup, nearly 300 different pins are available to the designing engineer and the shop mechanic.

As mentioned previously, the steel of which these British pins are made, must have sufficient ductility to be hammered out of shape without fracturing. A mild carbon steel containing some manganese is used.

The German system follows our taper closely. While the American and British standard is ¼ in. per foot or 1:48 the German taper, which is Metric, is 1:50. Whereas our system and that of the British base the sizes on the large diameter of the pin, the Germans reverse this procedure and use the small diameter of the taper to specify sizes. The following figures are English measurement for the convenience of the reader and are approximate only.

Diameters range from .025 in. to 1.969 in. and lengths from .158 in. to 11½ inches. Over 250 diameters and lengths are standardized. Figure 26 shows the relationship of the reamer to the pin. These standards show values for **A** and **B** which has been followed in Fig. 26. They also give the radius of the ends as R=d (both ends) which in our system is not standard practice. They do not specify the large diameter of the pin but do so for the large diameter of the reamer as **D** instead.

Straight pins are commonly used as dowels. One end is ground to a plus dimension so that it may be driven into the reamed hole. The other end is ground minus or undersize for a free fit in the mating piece. This is especially so when the pieces must be sepa-

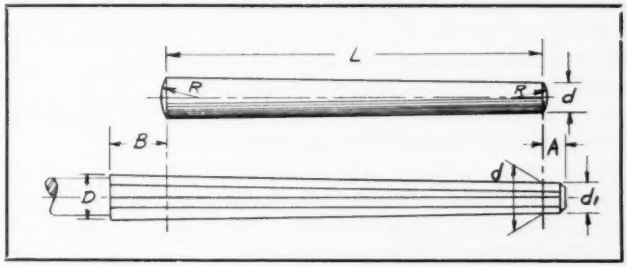


Fig. 26— Drawing illustrating relationship of the reamer to the taper pin.

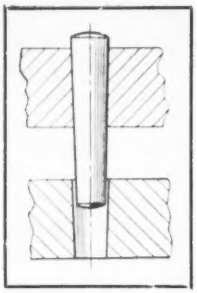


Fig. 27 — Drawing showing application of a taper pin as a dowel.

rated occasionally. When a tapered pin is to be used as a removable dowel as in Fig. 27, the two pieces are first drilled and then taper-reamed simultaneously. The pieces are then separated and the reamer again inserted into the hole in the lower piece. Several turns are given the reamer with but slight pressure to ream out a clearance. Because of the ¼ in. taper per foot, the reamer can be advanced from 1/32 in. to $\frac{1}{16}$ in. thereby resulting in a clearance of from .00065 in. to .0013 in. respectively. The pin can then be driven into the removable piece, having clearance in the lower piece. Thus, a common purchased taper pin may be used without resorting to an extra ground surface for the free portion of the pin. While the same number of operations on the hole are equal, the nicety of fit does not have to me maintained in the taper hole as in the straight hole.

This same procedure is followed in the hinge shown in Fig. 28. Such a hinge can be applied to a swinging door on a machine, a leaf jig in which the upper plate swings out of the way for loading the work into the jig body or other similar uses. The illustration shows the stationary ears or bosses at the extreme ends of the pin. The swinging part is assembled and clamped in place and the hole is drilled through the four portions. After the hole is reamed at the same setting, the reamer is inserted through both outer ears and the hole reamed oversize as explained previously. This is shown exaggerated in the sketch. This makes a very satisfactory straddle bearing. However, if it is desired, the design can be reversed whereby the free fit is between the outer ears and the drive fit in the stationary outer ears.

Another type of hinge assembly is shown in Fig. 29, but is different in design features than the one shown in Fig. 28. The swinging member is located in the center and pivots on the tapered part of the pin. The amount of freedom in the taper is adjustable by the threaded end. A hex socket, as in a socket set screw, is provided for adjusting means. The pin has a two-diameter straddle bearing in the stationary ears. When the desired adjustment is reached, the thin hex nut locks the screw in position.

Two other hinge designs, similar in nature but different as to adjustment, are shown in Figs. 30 and 31. In Fig. 30 the swinging member is bronzed bushed. The tapered pin is ground. The stationary member is straight reamed to accommodate the relieved part of the pin straight diameter. A flat pointed set screw locks the pin in place after proper adjustment has been made.

In Fig. 31, the pin is pressed into the stationary part shown at the

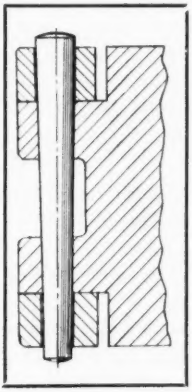
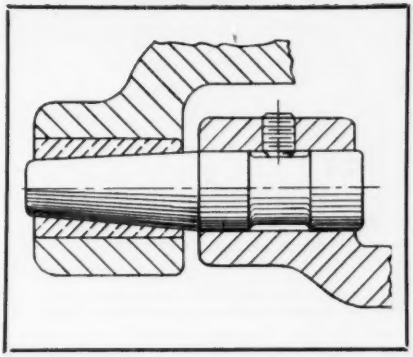


Fig. 28 — Drawing showing application of taper pin in hinge assembly.

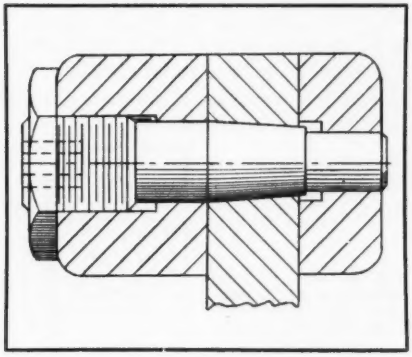
Fig. 30—Drawing showing method of fastening taper pin in hinge arrangement to provide for adjustment.



right. The swinging member is straight reamed and tapped for the bushing in which the taper bears. A lock nut sets the adjustment. In this design, the tapered part might be cut off to the dot and dash lines for a bearing length equal to the straight part of the bushing.

Of course, the majority of taper pin applications are designs in which the full length of the pin has a solid bearing or tight fit. And speaking of tight fit suggests a heavy duty assembly as the one illustrated in Fig. 32. In this tangential pin application, a previous design called for a straight pin. There was considerable torque on the oscillating shaft which tended to loosen the straight pin continually. A taper pin was substituted and the trouble was overcome. As is many other taper pin assemblies, the feature here lies in the fact that unlike a straight pin, the taper type can be reassembled time after time, always using the same pin.

The method of taper pinning in Fig. 33 was designed with a definite purpose in mind. Just as any long plane is said to align better if the middle portion is relieved, so here also is the pin relieved to form a type of saddle bearing as shown by the dimension lines. The leverage factor was considered to be better thus, than with one continuously long contact between the pin and the shaft.



The upper sketch in Fig. 34 is a partial repetition of the tapered tangential assembly in Fig. 32 but it is placed in a comparative position with the lower sketch. The upper view shows the center line of the pin exactly tangential with the outer surface of the shaft. In the lower view, however, the pin is placed entirely within the shaft circumference, whereby the outer surface of the pin is tangential to the shaft's outer surface. Of course, there is considerably more contact between shaft and pin. It is, however, not general practice to assemble in this manner. The reader can draw his own conclusions as to its value.

Fig. 29—Drawing showing application of taper pin in hinge assembly where swinging member is located in the center and pivots on tapered part of pin.

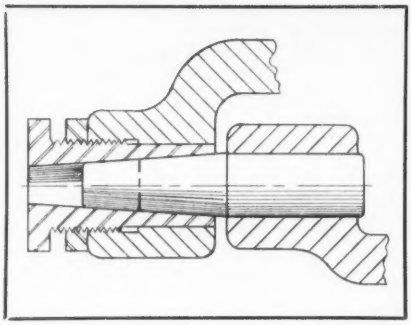


Fig. 31—A bushing and lock nut arrangement is used to provide adjustment for the hinge design shown here.

The straight pin with tapered end shown in Fig. 35 is suggested to replace pins having a straight body for its entire length whether it be either one or two diameters as in the case of a dowel. Two courses are open to the mechanic when he assembles a straight dowel pin. If it is ground one diameter for its entire length, it must have a drive fit into one member and an oversize reamed hole in the other piece. If a single reamer is to be used, then the pin must be ground with two diameters—one for a drive fit, the other for a sliding fit. In the pin illustrated, the advantage over a straight pin is that it can be used again and again if necessary. After a straight pin is pressed in and out once or twice, it no longer fits properly. The tapered portion of the pin shown overcomes this. Precision alignment can always be maintained with proper tightness in the hole. Such taper pins of varying size can be used to align brackets, bushing plates, lead screw nuts and other removable pieces that are disassembled frequently. They have also been used as stop pins limiting oscillating movements and as gauge pins. Used in groups of two, three or four they are effective as guide pins. In all the instances mentioned, the pins are hardened and ground all over. When used in blind holes this type of pin can be equipped with flats or squared head as illustrated at the beginning of this article.

Fig. 36 shows an effective method of anchoring spider arms by the use of a tapered end. Such knobbed handles can be seen on handwheels, levers, clamping devices and shifting mechanisms to mention a few. These are usually permanent installations. Here, the end of a new reamer may be used, or as mentioned previously, a shortened reamer is required if the large standard end is to be maintained for the straight part of the lever.

The sketch in Fig. 37 illustrates a tapered dowel being used in hardened steel bushings or liners. The mechanism body and mating piece are of cast iron. Precise alignment had to be maintained so the bushings, after grinding the o.d. and lapping the holes, were pressed into place. A hardened taper pin was also used.

Tapered pins or tapered parts of pin screws, especially those with ¼ in. taper per foot, make substantial anchoring devices. Two designs are shown in Figs. 38 and 39. In Fig. 38 a steel bushing is split three ways after the tapered hole is reamed. When the bushing is in place a common taper pin is hammered in, thereby expanding the

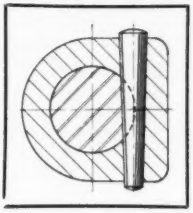


Fig. 32 — Drawing showing tangential taper pin application requiring full length tight fit.

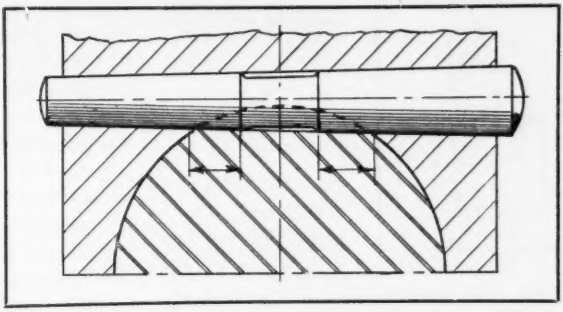


Fig. 33—Drawing illustrating method of taper pinning in which pin is relieved to form a type of saddle bearing.

bushing in its socket. In Fig. 39 the bushing has one slot for expansion. The upper part of the pin has a sliding fit in the held member and the hex nut forces the pin upwards to expand the bushing. The tapered part of the pin is hardened and ground. This type anchor is used in a blind hole.

Usually, when a collar is to be attached to a shaft and held in place by a taper pin, as in Fig. 40, the collar is first clamped and the two pieces drilled and reamed simultaneously. It is claimed that the method shown is more accurate, faster and very satisfactory. The collar is first drilled through one side only, as shown by the heavy lines at the large end of the pin. Then, when the collar is placed on the shaft, the drill, which is equal in diameter to the small end of the pin, is guided as with a bushing. The shaft and the other side of the collar are then drilled and thereafter reamed taper simultaneously.

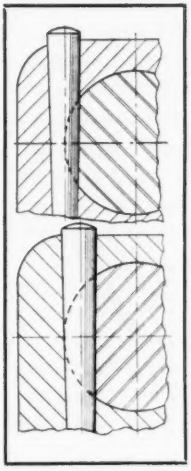


Fig. 34 — Drawings illustrating comparative positioning of tapered pins in tangential assembly.

A tapered reamer should not be used to ream a straight hole. This sounds paradoxical, but it has been done. Reference is made to the illustration in Fig. 41 in which a taper pin of sufficient length was used to hold a flanged member with a large hub on a shaft. In this example a No. 8 taper pin by 2½ in. long is used through a 5 in. diameter flange and a 1¼ in. shaft. The large end of a new reamer extends ⅝ in. beyond the large end of a standard pin. The reamer is shown in dot and dash lines. The drawing showed a tapered hole through 5 in. of hub. After the drill with a diameter equal to the small end of the pin went through the hub, the mechanic reamed and reamed and reamed until the pin from each end of the pin was 1¼ in. from the outside of the hub. He therefore reamed the hole straight for ⅝ in. with the tapered reamer before the pin was properly seated. When discovered, it was promptly changed with a counterbored hole 1¼ in. deep, as shown by the dotted lines.

In Fig. 15, a guard cap was shown for a tapered dowel that was withdrawn with a hex nut when it had to be disassembled. In Fig. 42, the guard

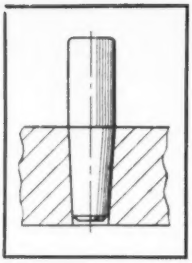


Fig. 35 — Drawing illustrating straight pin with tapered end.

cap also serves an additional purpose. The pin has a straight extension with squared end. The cap is actually a hollow-threaded plug. Whereas in Fig. 15 the cap was screwed on with finger pressure only so the pin would not be jacked out, in this instance the cap is screwed down tightly against the squared head of the pin. The cap is flatted to receive a wrench. Because the pin is assembled into a blind hole, a socket wrench is used to loosen the pin after the threaded cap is removed. In this design it matters little if the cap is tampered with accidentally as it would with the hex nut on the threaded taper pin in Fig. 14. The pin in Fig. 42 is case carburized and hardened and the taper ground.

For a taper pin that is withdrawn with a hex nut as the method used in Fig. 15, the Germans have found enough use for such a design as to standardize it with various diameters and lengths available. See Fig. 43. Here again the dimensions are given in approximate English sizes rather than in millimeters. For the smallest size, **A** is ¼ in. with the length of taper **B** of 1 5/16 in. The overall dimension **C** ranges from 1⅞ in. to 2¼ inches. The thread is ¼ in. in diameter with Whitworth threads. The largest pin of this standard has a small diameter **A** of 2 in. and a length of taper **B** of 6 inches. The overall dimension **C** ranges from 2½ in. to 14 inches. The diameter of the screw is 1½ in., Whitworth thread. As a comparison to an American standard pin size No. 10, the illustration shown in Fig. 43 has the following dimensions. **A** is ⅝ in., **B** is 2⅞ in., **C** is either 4 in., 4⅞ in., 5½ in. or 6¼ inches. It has a ½ in.—12 Whitworth thread, the length **E** of which is 1 inch. Diameter **D** is 11/32 in. and **F** is ⅛ inch. The radius at the thread end is 5/16 in., the height of the chord being 1/16 inch. The radius at the end of the taper is .025 in. and the radius next to the large end of the taper is 1/16 inch.

When a flat member must be located laterally in another member with extreme accuracy, the screw type taper locating pin will be found useful. See Fig. 44. The taper part is half in one part and half in the other so that each has half a bearing. The large end has a broached hex socket but can be saw slotted if desired. As the pin is screwed in, even though the loose piece is not in straight, they will automatically align themselves. This pin is hardened and ground.

An all-taper pin application is illustrated in Fig. 45. In this assembly, the shaft and collar had an oscillating motion of 150 degrees. The collar is fastened to the shaft by means of a taper pin which protrudes at the large end to act as a movable stop.

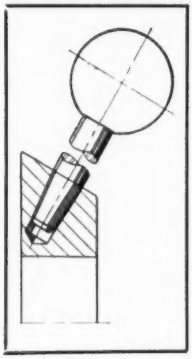


Fig. 36 — Drawing illustrating effective method of anchoring spider arms by the use of a tapered end.

Two other taper pins of the same size, but not the same length, are placed as shown in the upper view. Taper pins were used for stationary stops rather than straight pins because they could be driven in more firmly. All three pins are hardened.

Another form of taper hinge pin is shown in Fig. 46 which is similar to that portrayed in Fig. 29. Whereas the upper end of the pin in the latter drawing was threaded and locked with a hex nut, the present pin is threaded at the lower or small end. The center portion is the swinging member, and turns

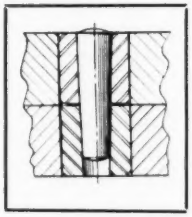


Fig. 37 — Illustration showing tapered dowel for use in hardened bushings or liners.

on the taper part of the pin. After it is screwed into place by means of a hex socket at the large end, whereby all shake is taken up, a short headless socket screw locks the assembly at the large end of the pin. The pin is hardened and all diameters are ground except the thread.

A tapered pin with an eccentric at the large end is shown in Fig. 47. It is required to position the upper piece surrounding the eccentric head, laterally along the lower members. The bottom plan view shows the eccentricity. When the pieces are assembled, the pin is inserted lightly into its taper socket and by means of a hex wrench, it is turned until the upper member is located correctly. The pin is then pressed in tightly.

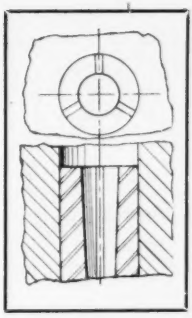


Fig. 38—Drawing illustrating use of tapered pin in conjunction with steel bushing which is split three ways.

In Fig. 48, a square stop pin with predetermined positioning grooves is shown. Only one taper pin, as shown in section in the upper view, is used. Six positions in ¼ in. increments are used. Half round tapered notches are reamed into the sides of the pin. On the other side, namely the left, these notches are reamed from above and are ½ in. apart. When the alternate ¼ in. movements are required, the taper pin is first removed. Then the square stop pin is withdrawn and inserted upside-down to the first hole shown at the right. It will be obvious that the notches on the right are reamed from the opposite direction as those on the left so the pin will engage properly.

Taper pins are sometimes slabbed off as the one shown in Fig. 49. They are used to retain endwise such details as washers, collars and slotted nuts.

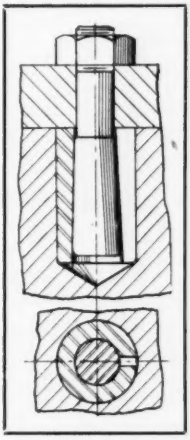


Fig. 39—In this illustration, the bushing is slotted at one point to provide for expansion.

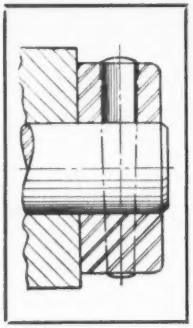
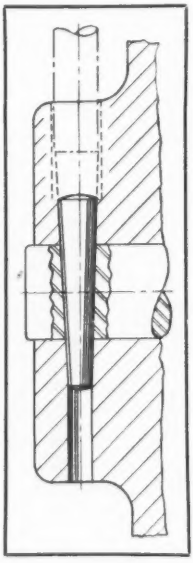


Fig. 40 — Drawing showing application of taper pin for holding a collar to a shaft.

The flat runs parallel to the axis of the pin and at first glance seems to be difficult to machine with any degree of accuracy because it is hard to hold. However, if a hole is drilled and reamed into a cast iron block and thereafter milled off so the top surface of the block exposes the tapered hole, the difficulty is overcome. The soft pin is then tapped into the hole and milled toward the small end of the taper, thereby always forcing the pin deeper into the hole. If milled in the other direction, the pin might loosen in its socket. If the pin is hardened then it can be surface ground along its length the same as milling. However, it can be fed in both directions or surface ground circularly as the feed is usually less than that of a milling cut. There is a fallacy connected with the use of such a flattened pin. It has been argued that the pin possesses lateral adjustment as it is pressed further into the hole, but this is not so. The axis of the pin does not change from the axis of the hole and if the flat is parallel to its axis, the pin cannot move laterally. But if the flat is machined parallel to the tapered side of the pin, then end adjustment would be possible. If this were the case, however, the flat would not function as it was intended. Careful positioning, accurate machining and selective assembly are necessary with the use of this pin.



Figfl 41—Drawing illustrating use of a taper pin of sufficient length to hold a flanged member with a large hub on a shaft.

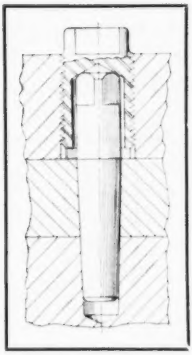


Fig. 42 — Drawing showing squared end taper pin provided with guard cap which also has squared end to receive a wrench.

In our American system, the largest standard pin is .706 in. in diameter at the large end. In the British system, their largest is ⅝ in., while the German standard is approximately 2 inches. However, the American system also has four special sizes. No. 11 pin has a large diameter of .860 in., No. 12 is 1.032 in., No. 13 is 1.241 in. and No. 14 is 1.523 in. or approximately ⅞ in., 1-1/32 in., 1¼ in. and 1½ in. at the large end. The lengths of these pins are also necessarily special.

Taper pins in this country are available in two types; namely, commercial and precision. In the commercial type

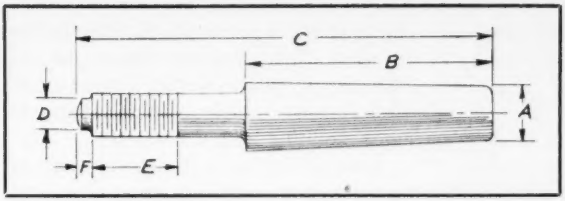


Fig. 43—Drawing of German taper pin which is designed for withdrawal by means of a hex nut.

for sizes from No. 7/0 through No. 14, the tolerance on diameter is + .0013 in. and — .007 inch. The tolerance on the length is ± .030 inch. In the precision type diameter and

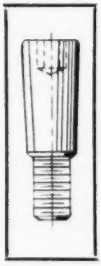


Fig. 44 — Drawing showing a screw type taper locating pin.

length tolerances are the same. However, the latter has a concavity tolerance along the taper of .0005 in. from the shortest length through 1 in. long. For pins 1 1/8 in. through 2 in. long this tolerance is .001 in. and in pins 2 1/8 in. and longer it is .002 inch.

In looking over the advertisements of the makers of taper pins, one finds that both heat-treated and unheat-treated pins are available. Other materials include brass, aluminum, Monel, nickel, stainless steel and Everdur. One company specializes in black oxidized finish.

Another company, manufacturing precision ground taper pins by the centerless grinding method, makes a pin smaller than a No. 7/0, which is .0625 in. diameter at the large end. The smallest pin is designated as a No. 8/0 and has a large diameter of .046 inch. Whereas the radius at each end of the standard pins is not specified in our American standard, this company shows the radius to be equal to the large diameter of the pin or to the nearest 1/64 inch. They hold the large diameter to ± .0003 in. in all sizes which is considerably less than the accepted standard. The height of the segment forming the ends of the pins is also given. The overall length of the pins is held to .003 in., also much

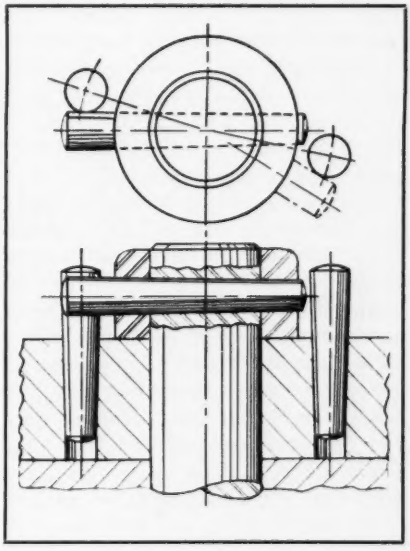


Fig. 45—Drawing showing an all-taper pin application in which both shaft and collar are subjected to oscillating motion.

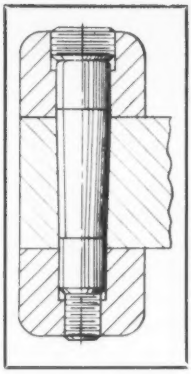


Fig. 46 — Drawing showing design of a taper hinge pin.

closer than standard. Another manufactures pins in three tolerance ranges as milled, generated and ground.

This article would be incomplete if information on taper reamers were not included. There are three general types of reamers on the market, having either straight, spiral or helical flutes. Straight fluted reamers have three to eight flutes depending on their size. They have a square milled at the end of the shank for a hand wrench. They are made of carbon and high speed steel.

The so-called spiral fluted type have from three to eight long helical cutting edges. The flutes are regularly furnished milled left hand. They also can be had with a milled square at the end of the shank and are made of carbon and high speed steel.

The helical fluted reamers are regularly furnished with left hand flutes. They have a plain shank without a square end and are used for machine reaming. They have two to four flutes depending upon the diameter. Short helix helical reamers have double helices. Because these reamers are free-cutting, in most instances they can be used for hand reaming also. Breakage is said to be reduced to a minimum as the chips will not pack in the flutes. It is claimed that both the spiral and helical types are not inclined to produce a jumpy cut as will the straight fluted type at times, as the chip is cut with a better shearing action. Helical reamers also are available in carbon and high speed steel.

Another helical reamer for cutting under power is the Gammons type. It can be used in a drill press or in a portable electric or air drill. The helix is much steeper than either the spiral or helical types mentioned above. It has a single helical flute of comparatively short lead. The small end of each reamer will enter the hole reamed by the next smaller diameter reamer, which is true of all the types mentioned.

Summary

As a summary to this article, several suggestions are appropriate for both the draftsman and the mechanic when working with taper pins.

1. Always drive home a taper pin, keeping in mind that $\frac{1}{16}$ in. of length varies the diameter only .0013 inch.
2. Always provide for the removal of a taper pin, either by a through-hole or by a flatted or square head or by means of a screw thread and nut.
3. When driving a taper pin in or out, it is best to use a brass

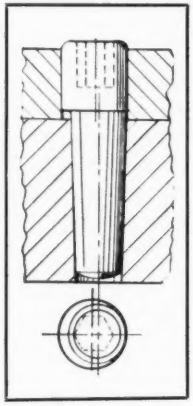


Fig. 47 — Drawing showing design of taper pin on which an eccentric is provided at large end.

rod or a hard bronze, like Tobin bronze, to avoid injury to the pin or surrounding surfaces.

4. When units are disassembled frequently, a taper pin does not wear by shearing as much as a straight pin and can be driven in with original tightness.
5. Hardened Standard taper pins are commercially available.
6. When using taper pins as dowels in connection with screws, always have the mean diameter of the pin at least equal or larger than the root diameter of the screw thread.

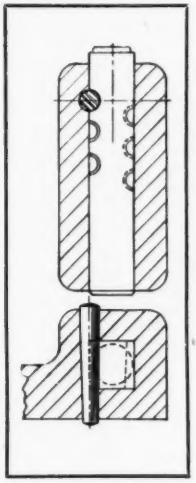


Fig. 48 — Drawing showing application of taper pin used in conjunction with a square stop pin.

7. In critical places, such as inside gear boxes or other moving mechanisms, provide a means of locking the pin against possible loosening.
8. Use as short a taper pin as possible, consistent, of course, with good design. Shallow holes are more easily reamed thereby saving time and reamer expense. Also sharpening will be less frequent.
9. Worn or broken reamers can be salvaged and used for short taper pins when the large end of the standard pin is used as the basic dimension rather than an intermediate diameter.
10. A removable taper pin should always be heat-treated at least at the removing end, if not on the engaging tapered surface.
11. If a head is provided for removal of the pin, it can always be twisted with a socket wrench if the head is to nest into a cast recess or in a counterbored or tapped hole.
12. Because of its very slight taper, only 1 deg. 12 min. included angle, a taper pin becomes a very powerful wedge and has excellent holding power.

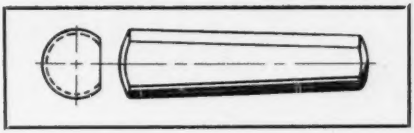
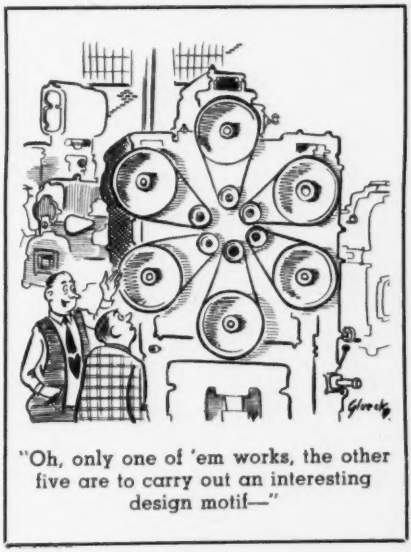
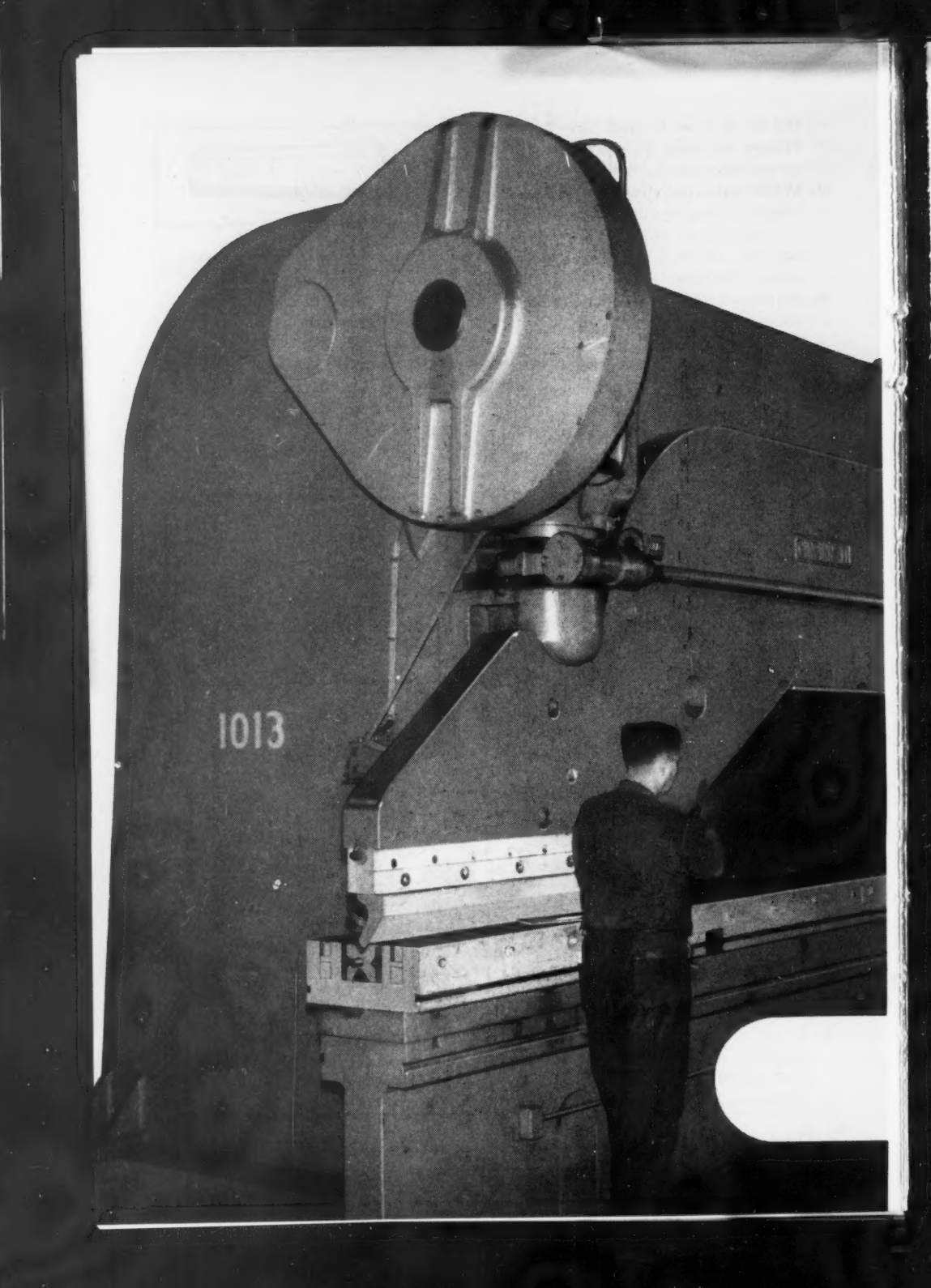


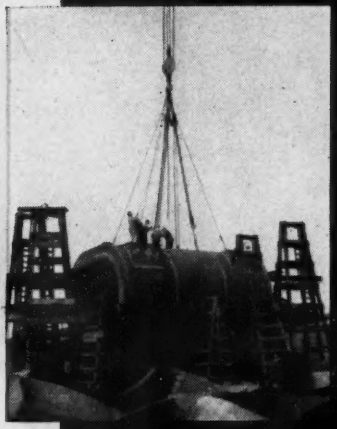
Fig. 49—Drawing showing taper pin which is provided with flat section parallel to the axis of the pin.



"Oh, only one of 'em works, the other five are to carry out an interesting design motif—"


1013

Here - a Cincinnati Press Brake saves 3 ways...



1. TIME
2. NUMBER OF OPERATIONS
3. MATERIAL

Built at The Maryland Drydock Company, these giant condensers for the Westinghouse Electric Corporation are some of the largest ever constructed.

Photographs courtesy of The Maryland Drydock Company, Baltimore, Maryland

Crimping plate up to 3" thicknesses has cut roll-forming time in half at The Maryland Drydock Company.

The press brake crimps the ends of the plates with special dies, and has eliminated both the costly burning operation, and the loss of 15" to 18" of the ends of the plates.

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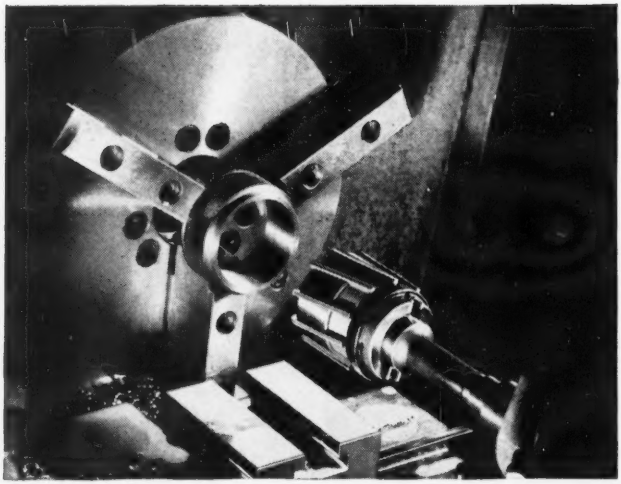
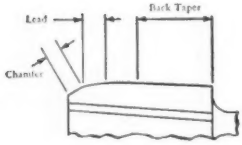


REAMER DESIGN Controls

Accuracy, Finish and Production

Barber-Colman Reamers produce finishes which were not previously considered possible on a standard production operation. Exceptional accuracy and tool life are also obtained on production runs as a result of the special features of Barber-Colman Reamers. Both solid-fluted and inserted-blade reamers are available.

Irregular flute spacing provides a smooth cutting action and fine finish, and helps to prevent the reamer from forming "welts". As a standard feature on all Barber-Colman Reamers, flutes or blades are spaced diametrically opposite each other so that they are easily checked with a micrometer.



The profile form on Barber-Colman Reamers is designed to produce the best possible finish and tool life. Following the chamfer, the lead is blended into a radius to produce exceptionally fine finishes. Through Barber-Colman cam-controlled sharpening, a sharp cutting edge, rather than a cylindrical land, is produced, resulting in a freer cutting action. With this control, successive reamers are sharpened with exactly the same profile form and relief angles to provide exact duplication of size, straightness and roundness.

DESIGNERS OF STANDARD AND SPECIAL

20-25 micro-inch finish typical

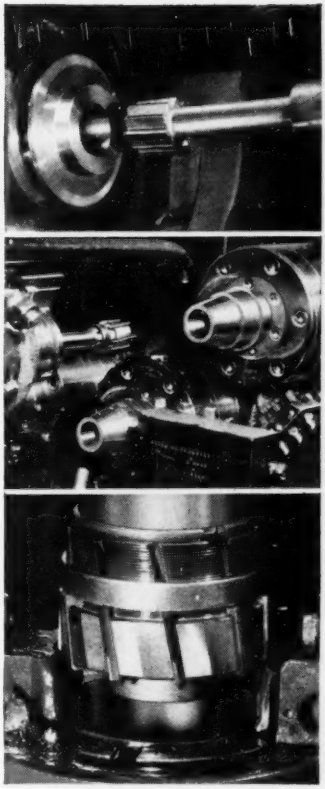
On this job, 1000 pieces are reamed to a surface finish of 20-25 micro-inches before it is necessary to re-sharpen the reamer. The feed is 1.75" per minute at 280 rpm., requiring 30 seconds to ream the $\frac{7}{8}$" length of cut. Material is AISI C1137 steel.

1500 pieces per sharpening

This carbide-tipped inserted-blade reamer produces from 1100 to 1500 pieces per sharpening while maintaining the finish better than 60 rms. Tolerance on hole size is .002". Stock removal is .012" to .015" on the diameter, and the material is B1117 steel. Speed is 105 sfm, and the feed is .0088" per revolution. A Barber-Colman Reamer Sharpener reproduces the correct profile on the reamer blades with each sharpening.

tool cost reduced from $1.57 to $1.32

These Barber-Colman Reamers are producing truck cylinder liners with accurate straight round holes free from welts or taper at a tool cost 15% less than previous records. Material is cast iron. Replaceable blades with carbide tips give long reamer life and cutting edges which stand up under continuous production. 675 more pieces per set of blades are now obtained, and tool cost per 100 liners has been reduced from $1.57 to $1.32.



If you are now choosing between accurate, quality-finish reamed holes — and low-cost production and tool maintenance — you can have both, using Barber-Colman Reamers. More flutes per cutting diameter, solidly backed cutting edges, and standard irregular flute spacing will give you tool room reaming quality under regular production conditions.

Send specifications on hole sizing and finishing problems to Barber-Colman engineers. They will furnish reamers for your particular requirements to give you the desired quality consistently.

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Engineering and craftsmanship at National Twist Drill concentrate on giving you the finest cutting edges that money can buy. You can expect long, dependable performance—consistently.
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Radio Speeds Drop Hammer Die Handling

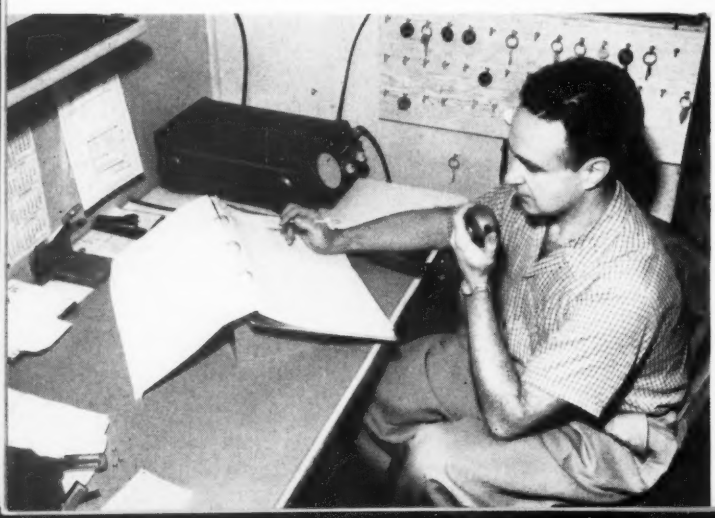
By Gilbert C. Close

Aircraft plant utilizes two-way radio communication system for close contact between outdoor die handling lift trucks and drop hammer die department.

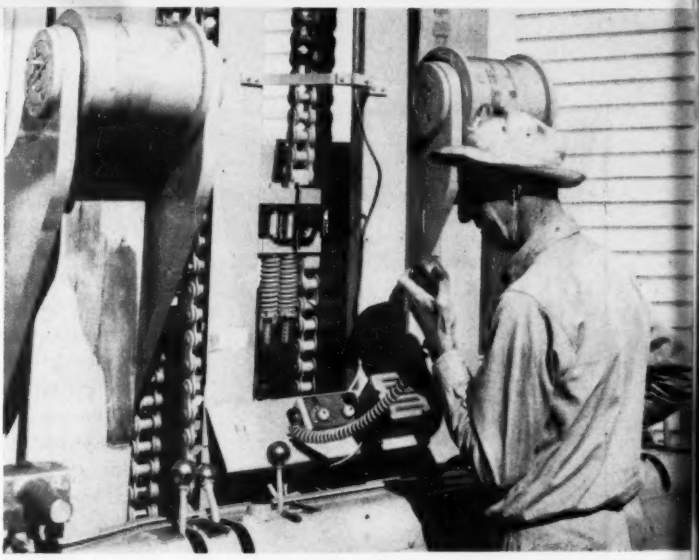
COMMUNICATION by low-power radio between widely spaced plant areas or sections has proved successful in many industrial installations, but use of the same medium to speed a specific job is something relatively new. Illustrative of this latter use is the system now in operation at the El Segundo, California, plant of Douglas Aircraft Company where low-power radio is employed to speed up drop hammer die handling and changing.

The some 3,600 hammer dies now in use at Douglas are stored out-doors and some distance from the drop hammer department. These dies are handled to and from the drop hammers by specially designed lift trucks which clamp the die from the side. However, prior to the use of low-power radio, the problem of getting the information of when and what die was needed in the department to the lift truck operator was a trying one, involving a lot of leg work and lost time.

After some consideration of this situation, the Plant Engineering Department decided to install low-power two-way radio on each of the lift trucks and in the drop hammer department. However, as this



The dispatcher receives word from the drop hammer department that a drop hammer die change is necessary, along with the tool number.

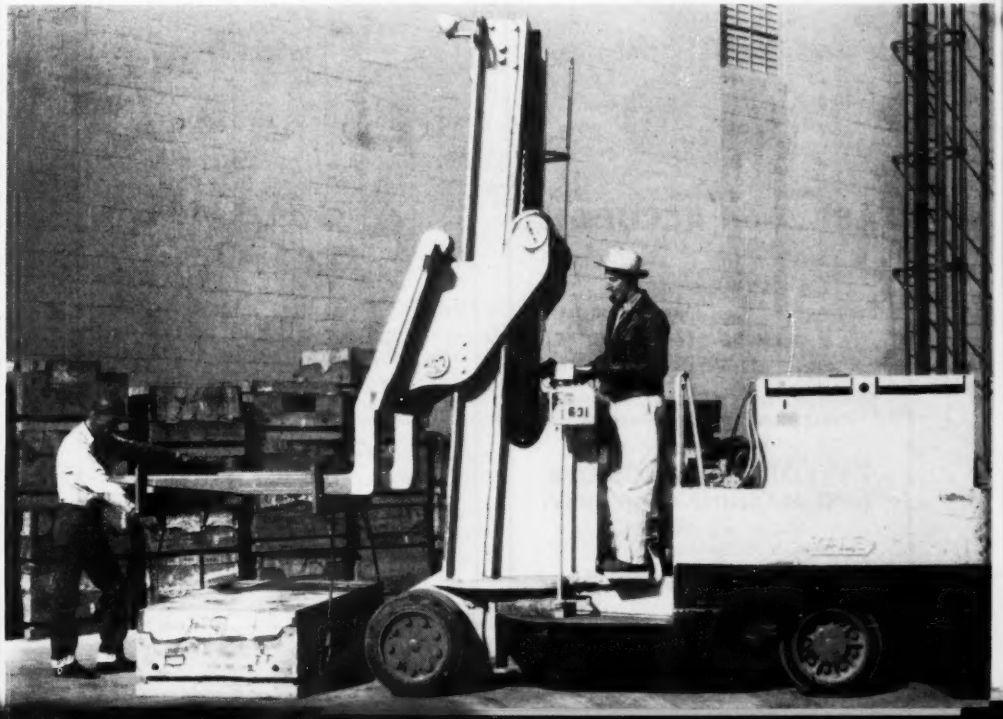


In the drop hammer die storage yard, a half mile from the drop hammer department, a lift truck operator receives the information as it is relayed by the dispatcher.

radio communication system will eventually be used for other functions, it was decided that both the departmental radio and the radios on the various lift trucks must filter through a central dispatcher.

Today, when a drop hammer die change is necessary, the dispatcher is notified directly from the drop hammer department, along with the num-

In the average time of about a minute after word leaves the drop hammer department, the die is being loaded for transport to the department.



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ber of the die needed for replacement. The dispatcher in turn calls one of the lift trucks and passes this information along. Thus, in an average time of about one minute, the lift truck operator has been notified and given the number of the die required. In another minute or so, he is on his way to the drop hammer department with the required tool.

This initial test proved so successful that the company is now installing two-way radio on more than 30 lift trucks and carloaders for all types of operations throughout the 381 acres of plant property.

Illustrations courtesy El Segundo Division, Douglas Aircraft Company

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

"It's not only the most efficient turret lathe in the shop, but it also plays phonograph records at three speeds."

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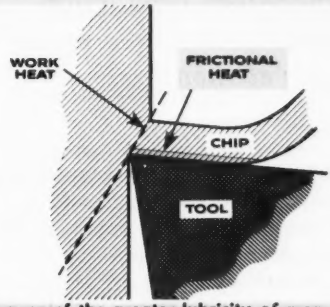


Because of the greater lubricity of wax and its polar attraction for metal, Wax-Cool is the first water-soluble coolant to greatly reduce *frictional* heat at the tool-chip interface . . . as well as check *work* heat generated in the shearing zone.

Wax-Cool has these advantages:

1. **WAX-COOL** stays with tools and material even under high heat and pressure.
2. **WAX-COOL** prevents chip weld because work runs cooler.
3. **WAX-COOL** effectively minimizes *frictional* heat, which is by far the principal source of heat.

Here is proof!

Parts of a stud driving gun (#4140 annealed alloy steel). Smooth finish at left resulted from Wax-Cool's greater lubricity. Poorly finished part shows results obtained from ordinary coolant.

Here are Wax-Cool's other benefits:

- **Tool life almost doubled.**
- **Finish feed stepped up from .004 per rev. to .007 per rev.**
- **Speed increased from 300 R.P.M. to 680 R.P.M.**
- **Eliminated problem of handling hot chips.**

A test is your best proof

In your own shop, Johnson's Wax-Cool can show you savings in tools and time plus performance standards you never believed possible. Call your local Johnson industrial distributor, or write to:

Ask about Wax-Cut—wax-type cutting *oil* for automatic screw machines, gear cutting machines, etc.
Ask about Wax-Draw—wax lubricant for drawing and forming all types of metals.

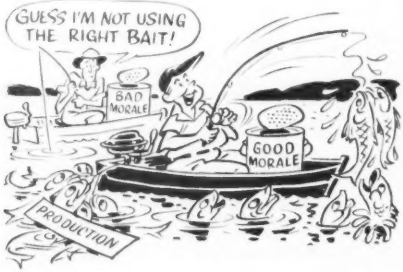
Industrial Products Department MMS-5
S. C. Johnson & Son, Inc., Racine, Wisconsin

Getting Out Increased Production

By Alfred M. Cooper

According to the author, increased production depends more upon good day-by-day supervision on the job than any other single element.

IF we concede that a modern machine shop is furnished with the latest type of machine tools and equipment, then it should be obvious that any increase in worker production thereafter becomes primarily a personnel problem. We may assume that slow-downs and rough handling of the finished product have been eliminated.



". . . . and their supervisors appear relaxed even while they get out production of superlative quality and quantity."

Having discussed this matter of increasing production with supervisors in many plants—with men whose experience in handling such problems has aggregated more than 100,000 years—I have found these key men pretty well agreed on certain fundamentals regarding this question. The following is a consensus of this agreement by men I consider to be experts.

Illustrated by Don Ritchie.

Morale is a word that has been worn somewhat threadbare, but you nevertheless sense the degree of its presence or absence the moment you enter any manufacturing department or organization. If good morale exists, everything appears to be moving along smoothly, the men and machines are working in harmony, and particularly the workers and their supervisors appear relaxed even while they get out production of superlative quantity and quality. In such a department, spoilage is at a minimum and grievances do not exist.

Where good morale is absent, you find a harassed foreman working hard, but under severe handicaps, and a group of workers which is so busy nursing ill-feeling that it can give but a portion of its attention to getting out adequate production. The pity of it is that that foreman is actually working harder than any man in his depart-

ment and can't understand why production may be off 30 per cent.

Unfortunately, too, when morale is low, injuries to workers increase, both as to frequency and severity. Machine safeguards can and will prevent a certain percentage of accidents, but whenever you hear of a department that has a really exceptional safety record you may be sure it has a foreman who knows how to handle men.

Although we do not give much publicity to the matter, all of us know that our industry is now on pretty much of a war production basis and is likely to remain so for some years to come. In view of the world situation, this is not surprising; indeed, if we were doing business as usual, we would not be living up to our responsibilities as the leader among all nations of the free world.

However, we appear to have learned something about getting out maximum production even since the days of World War II. In most plants and departments, unbelievable quotas are met with a minimum of fuss, and there is an almost total absence of the hooraw and vaudeville that accompanied our efforts to step up production during those earlier hectic years.

Perhaps that is one reason why our production records are better, our accident rates are lower, fewer among our foremen develop apoplexy, and there exists less friction between the worker and his boss. Perhaps, too, the whole world will soon come to understand that production on such a scale can only be attained under the free enterprise system, where the workers' rights, life, and physical well-being are vitally important to management.

It is impossible to conceive of high morale existing within a socialized industry. No matter how hard management and the foreman strive, a work force that is improperly supervised performs like a group of automatons,

". . . . a work force that is improperly supervised performs like a group of automatons."

knowing full well that their lives and limbs are not especially important to their masters, and that mediocre output will get them by. It must be discouraging to those hardboiled masters to observe the smoothness with which a free people can outproduce slave labor two-to-one.

In discussing this matter of improved morale with many groups of foremen, I have found these bosses in agreement on certain fundamentals as regards to bettering the spirit of an organization. The most important of these points may be summarized as follows:

"He must know exactly . . . . when to give a pat on the back."

1. The man in charge of any department must be a genuine leader of men—never a driver. He must know exactly when to issue a reprimand for laxity of performance and when to give a pat on the back, a good word in the front

office, and perhaps even to recommend promotion to the man who demonstrates exceptional ability.

2. The foreman must also recommend that some sort of incentive plan be placed in effect within his plant and his department. As a rule he can go no farther than make a suggestion to this effect, but if the choice here is between encouraging mediocrity or rewarding the exceptional worker, there can be no honest hesitation in such a matter.

". . . . the foreman's opinion in matters of this sort carry genuine weight with the higher-ups."

Where such setups as the McCormick Plan are functioning smoothly, the foreman's opinion in matters of this sort carry genuine weight with the higher-ups. On the other hand, I once reported to a boss who, on his own initiative, often made himself somewhat unpopular in the front office by insisting on additional perquisites for workers who really got out production—and that man is today general manager of that corporation.

3. Ten years ago we sometimes made the mistake of confusing morale improvement with vaudeville. That is, we might have felt that a dance hall for the swing shift, or dance band music over loud speakers during working hours, would step up production. These devices were not helpful, of course, even though they sounded good on paper. This time we are not making such mistakes.

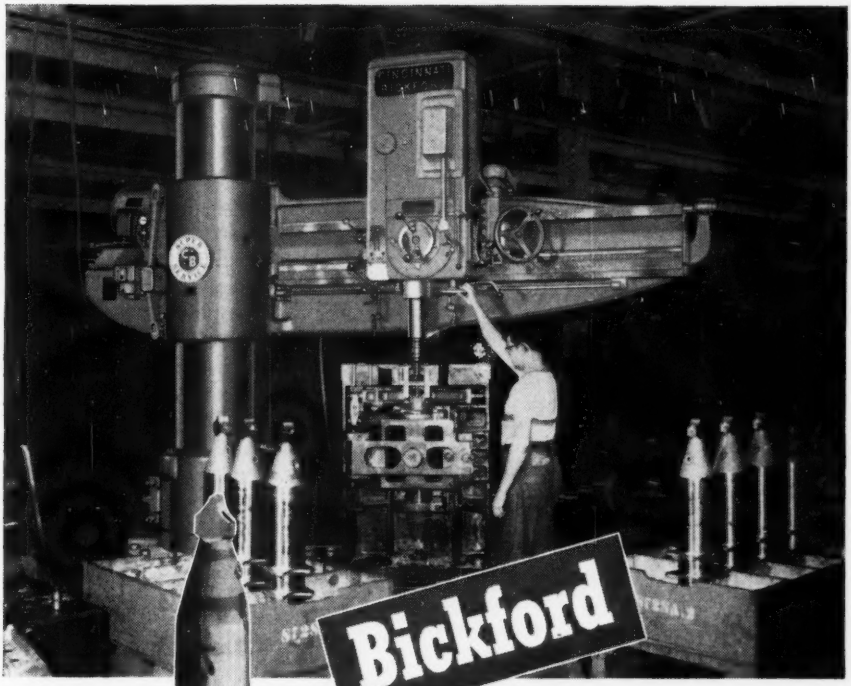
Instead, we are coming to appreciate exactly what the worker wants, if he is to do his level best on the job, and we give him these things. Thus, we cut out all entertainment except the usual after-hour activities in the line of sports and similar enjoyment which, through the years, have proved their worth. But we never attempt to substitute such programs for needed increases in pay or improved working conditions.

4. In the immediate future we can foresee no reason why wages should be reduced—certainly not until taxes are cut and the cost of living has been sharply reduced. However, if this situation ever comes to pass, each employee should be fully informed as to the exact reasons behind such changes in rates of pay, and these reductions should be justified without equivocation.

Reduction of pay is something the newcomer among supervisors may never have encountered. It is likely that this situation may prove definitely whether or not a supervisor has what it takes to keep up worker morale when the going is hard. Some of us can remember the days of '29 when not only wages were cut but many workers were of necessity laid off. At that time, many supervisors and executives who did well during the boom years of the '20's quietly faded from the picture.

". . . . or dance band music over loud speakers during working hours would step up production."

It is to be hoped that no existing su-



Photos courtesy—The Cleveland Pneumatic Tool Company, Cleveland, Ohio.

gives *complete* satisfaction . . .

The convenient centralized controls, the wide range of speeds and feeds, and the high visibility head of this Cincinnati Bickford Radial Drill are all contributing to fine performance on this job.

The Cleveland Pneumatic Tool Company say "Performance and ease of handling are all that could be desired."

On this cylinder for an aircraft nose type landing gear, drilling, reaming and spot facing operations are being done.

Cincinnati Super Service Radial Drills are accurate, powerful and profitable in the shop.

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Cincinnati 9, Ohio, U.S.A.

pervisors will find it necessary to justify wage reductions in our time. But if this should become advisable, the amount of dissatisfaction engendered depends almost entirely upon the type of supervision the workers receive. And this in turn depends upon how clearly the facts are presented to these workers.

". . . . the amount of dissatisfaction engendered depends almost entirely upon the type of supervision the workers receive."

In one large plant in which I was employed in Chicago it became necessary to reduce the work force from 42,000 to 18,000, and within a period of a few weeks. To the genuine surprise of management the production in that plant remained almost exactly the same. This was an unusual instance, of course, in which over a period of years quite an amount of "dead wood" had been permitted to accumulate in the work force. When it became absolutely essential to dispense with this, production was little affected—indeed, in some departments it increased.

5. Ordinarily, nobody would suggest either paycuts or layoffs as methods of improving morale. More likely, we can assume that the foreman is doing a full day's work for a full day's pay. Also, we should be able to assume that the foreman is doing a good job in handling men and that the accident rate is being kept at a minimum. Even under these conditions, however, there are a couple of matters that call for thought on the part of management, particularly if we are forced into another all-out war effort.

(a) One of these is the necessity of giving the worker as much say as possible in matters pertaining to his own welfare. In administering such a plan over a period of four years I found that the consensus of a group of 10,000 workers was always reliable, fair, and workable.

The greatest difficulty in putting such a plan into effect lies in being positive that every man on the job knows exactly what the problem is and then is permitted to state his considered opinion regarding the matter. This plan does not substitute for the use of suggestion boxes. The only desideratum is that some method be developed whereby the individual employee (like the individual citizen at our national elections) can cast an intelligent ballot on the problem under consideration. My experience proves this can be done providing a little time has been given to acquainting each employee with all the facts regarding the problem to be decided.

Such instruction is a genuine teaching job and cannot be handled by posting notices on bulletin boards or by issuing casual mimeographed brochures. Neither can committees successfully represent employees in this particular instance any more than we would permit committees to do our voting for us when we elect a mayor or a governor. Frequently such information can best be put over in a conference led by the immediate supervisor of the workers. It is a curious fact that

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to your smooth industrial operation

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- He carries a myriad assortment of tools, machines, parts, accessories and manufacturing staples—and generally in exactly the right types, designs, grades and sizes you require.
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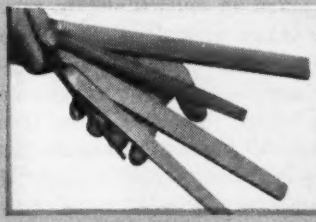
- He knows where and how to obtain scarce or sorely needed operating requisites – thus sparing you the time and expense of searching for them yourself.
- He explores the globe for new and improved equipment, appliances and other items that may speed up your production and cut your costs.
- He has a reservoir of information about tools and machines from which you can benefit year after year.
- As a "clearing house" for all your plant-operating requisites within the foregoing scope, your Industrial Distributor can take over from you a lot of costly bookkeeping—and headaches.
- By serving many industrial consumers he also serves many producers, thus reducing *their* "paper work" too . . . which enables them to pass further savings along to you.



Yes, the industrial distributing system has so many advantages to all who use it that it is an indispensable and valuable factor in the economics of free enterprise. Nicholson continues to subscribe to its principles in both words and action.

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a supervisor who could not make a set speech to save his life can lead a bang-up conference. This is true since the procedure in such a meeting calls for the workers to do most of the talking, while the supervisors confine their participation almost entirely to asking questions. It goes without saying that all information put over in such

". . . . this can be done providing a little time has been given to acquainting each employee with all the facts regarding the problem to be decided."

a meeting must be 100 per cent factual.

(b) We may be thankful that so far we have never had to give serious consideration to the matter of maintaining a high degree of worker morale under conditions of atomic warfare. Naturally, we all hope such a catastrophe will never be visited upon the world. Nevertheless, we would be unwise not to consider ways and means of maintaining employee morale at a high level in the event of such an occurrence.

During World War II this problem was not encountered, since this nation and its industries were never exposed to direct enemy attack. In another war we probably will have to prove that those who say our workers "can't take it" are not very well acquainted with these people.

Two solutions to the morale problem stand out in such an eventuality. The first is that we must encourage workers not to congregate when off duty, but rather to develop something different in recreational activity that did not exist in our earlier wars.

The armed forces meet this problem by setting aside areas of public land to which combatants may repair during their periods off duty. Industrial management may find it necessary to do something similar for its employees and their families. There are yet many millions of acres of public land available for such use, comprising forests, deserts, and mountain retreats. If industrial sections are unavoidably exposed to enemy attack, then it may be imperative that the worker and his family have available certain areas removed from industrial centers, yet which can be reached without too much expenditure of time or gasoline. Such regions exist all over this great country of ours.

In these isolated areas the worker will be given an opportunity to relax and to indulge in almost any form of activity—except perhaps hunting—during any week-end. The morale-building effect of getting away from the strain and worry in this connection would justify any efforts made by management along these lines.

In the event of another war, it must be borne in mind that the outcome will depend upon our industrial output, and

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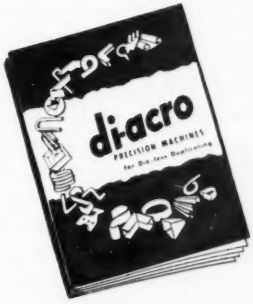

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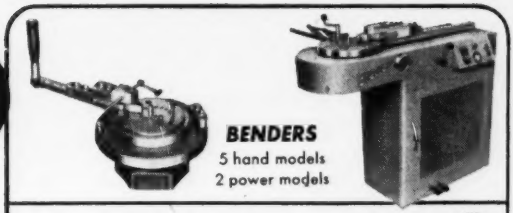
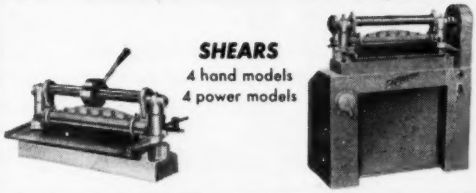
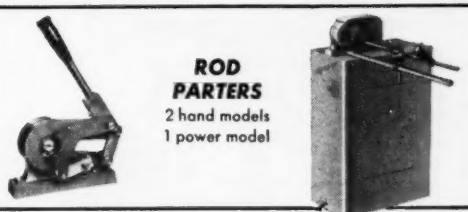


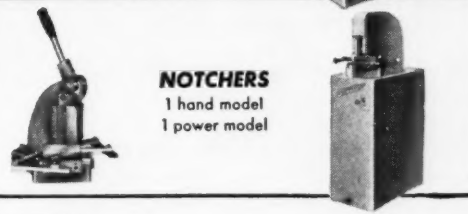
BENDERS
5 hand models
2 power models



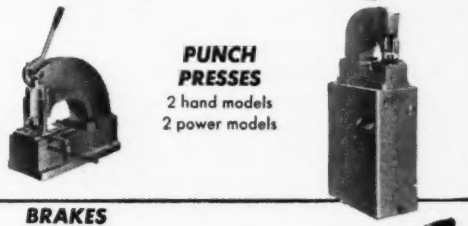
SHEARS
4 hand models
4 power models



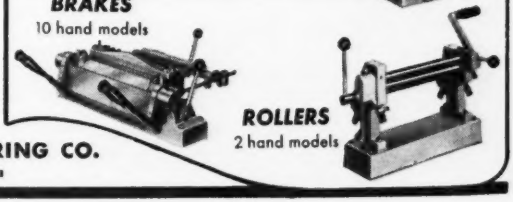
ROD PARTERS
2 hand models
1 power model



NOTCHERS
1 hand model
1 power model



PUNCH PRESSES
2 hand models
2 power models



BRAKES
10 hand models

ROLLERS
2 hand models

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this in turn will be affected by the welfare of the worker, his wife and children. Neither taverns, movie theatres, nor dance halls can furnish safe, adequate recreation for these people at such a time. Yet without recreation in some form no human can withstand the strain of this type of warfare for very long.

6. Should it become necessary for our workers to turn out unheard-of production under such conditions as

". . . . thought must be given to the possible necessity for rebuilding destroyed plants and getting these into production again within the shortest possible time."

we are considering, thought must be given to the possible necessity for rebuilding destroyed plants and getting these into operation again within the shortest possible time. This means, first, the development of every form of physical protection for the worker (such as dependable bomb-proofs, and so on), and second, the training of supervisors in effective methods of emergency supervision.

The second of these is perhaps the most important, and may also be the most difficult of procurement. All of us have a habit of getting out production according to some sort of schedule, and emergencies play havoc with schedules.

Supervising a group of workers which is exposed either to sabotage or to enemy attack calls for the best in emergency supervision. What will happen in any industrial plant cannot be clearly foreseen, and the remedy for any unpredictable occurrence depends so very much upon the relationship of the worker and his immediate supervisor—that is, upon the morale existing within any department of that plant.

When a group of workers may be depended on to jump in and repair any conceivable damage that may be inflicted on its plant, and do this quickly; when the group has genuine confidence in its management and in the judgment of its immediate supervisor; and when every man on the job is loyal and trustworthy—then truly shocking conditions may be made light of and rapidly corrected, so that full-scale production may be resumed at the earliest possible moment. Under any other circumstances we may expect confusion, fear and fumbling, with consequent loss of time and inability to back up the efforts of our armed forces.

There is every reason to hope that the world may decide to avoid another all-out conflict. Appreciating that even the winner of a modern war frequently loses more than he gains, the present-day worker may well complete his cycle of usefulness in an atmosphere of peace.

But a rich nation such as ours would be extremely foolish to set itself up as an easy, vulnerable target for an aggressor that envies our prosperity. Therefore, we need excellent defenses backed by an industrial system operating under free enterprise and definitely superior to anything in this line existing in the world. So long as our workers cooperate with their manage-

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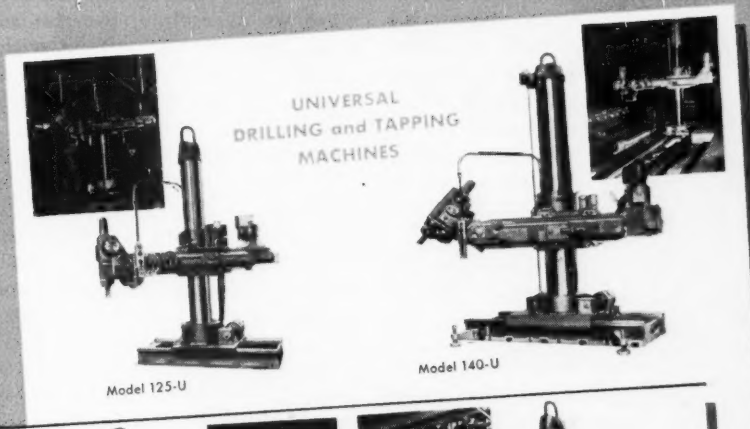

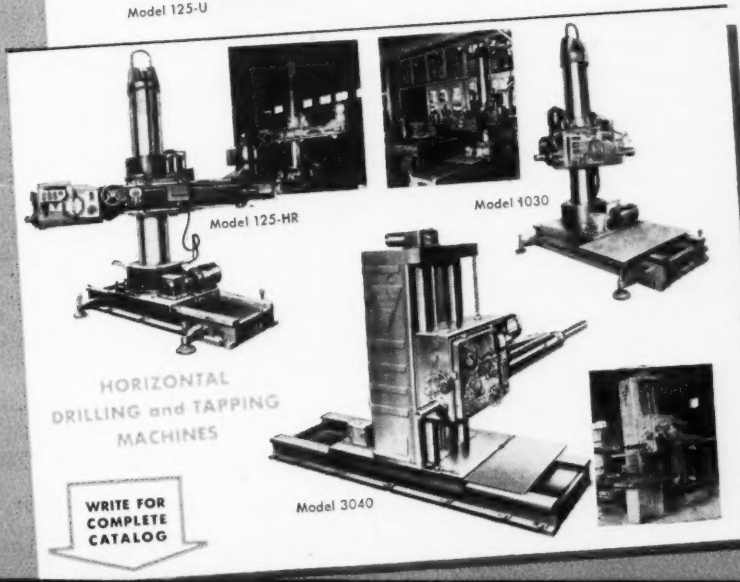

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KAUKAUNA, WISCONSIN, U. S. A.

ment, and particularly with their immediate supervisors, we have nothing to worry about, either in time of peace or in time of war.

In the past there has been some concern about the loyalty of certain elements among our citizens in case of attack by a foreign power. Today there is less of this feeling of uncertainty than at any time within recent years. Disloyalty to the nation is becoming increasingly unpopular and nothing discourages those who would breed discontent so quickly as effective leadership within our industries.

"Our workers have become accustomed to surpassing all others in production."

As matters now stand, any person or nation that seriously attempts to undermine the good relationship existing between our supervisors and workers probably will be in for a genuine shock. Americans have a way of taking their splendid position for granted, but they also have a way of casually shrugging off those who would overthrow their way of life.

Our workers also have become accustomed to surpassing all others in production, and without making much fuss about the matter, they take genuine pride in this fact. Those who have tried to upset this applecart have awakened next morning with violent headaches.

Rarely do we now hear of any group of American workers which would like to see some other system substituted for our present form of constitutional government. Whenever there exists dissatisfaction, it is more likely to be manifested against some minor supervisor rather than against management itself. This fact is understandable when we appreciate that this supervisor is in constant contact with the worker all day long, while management may constitute a group of higher-ups with whom the worker may have dealings but once or twice yearly.

Increased production wins wars and makes for a prosperous nation in time of peace. Perhaps the most important factor in either instance is that immediate supervisor—the man who directly bosses the efforts of those who get out this production. Whenever production falls off, or whenever it is essential that it be stepped up, this is the man who must be consulted and, if necessary, trained. If he is the right man for the job, he can get amazing results. If he has shortcomings he can be trained. If he is simply the wrong man for the job, he must be replaced.

Increased production depends more upon good day-by-day supervision on the job than on any other single element. Bearing this fact in mind, we may well be proud of the type of supervisor we now have in our industries.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Tool Grinders by Ex-Cell-O

STYLE 44-A, Ex-Cell-O Precision Carbide Tool Grinder. A new model for sharpening single point tools. Inbuilt motor precision spindle. Ample pressure coolant flow.

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It shows and describes five models; also gives important data on tool grinding. Address Ex-Cell-O in Detroit; ask for BULLETIN 46262.

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53-26

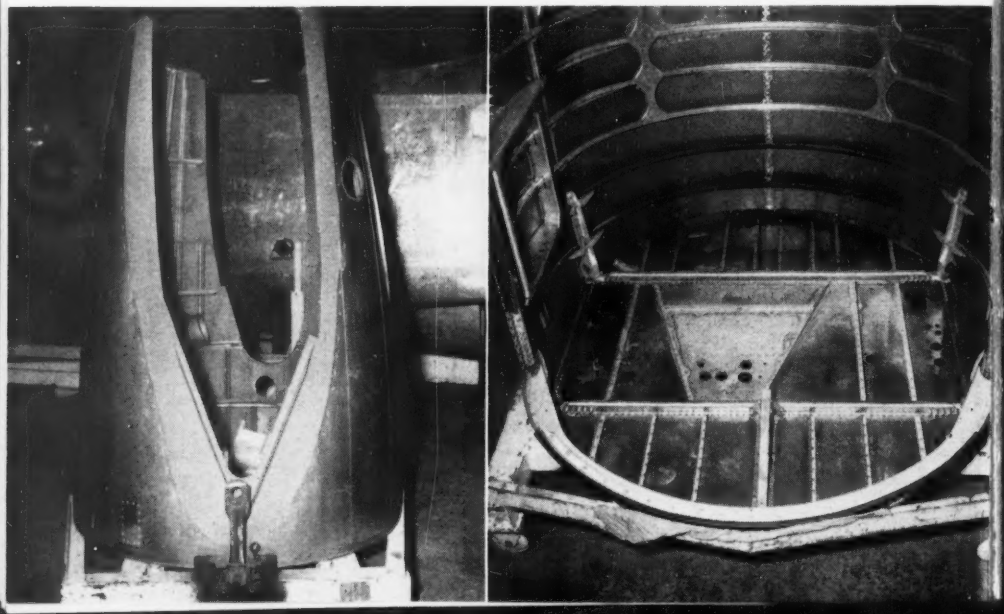
Complete Nacelle Fabricated From Titanium

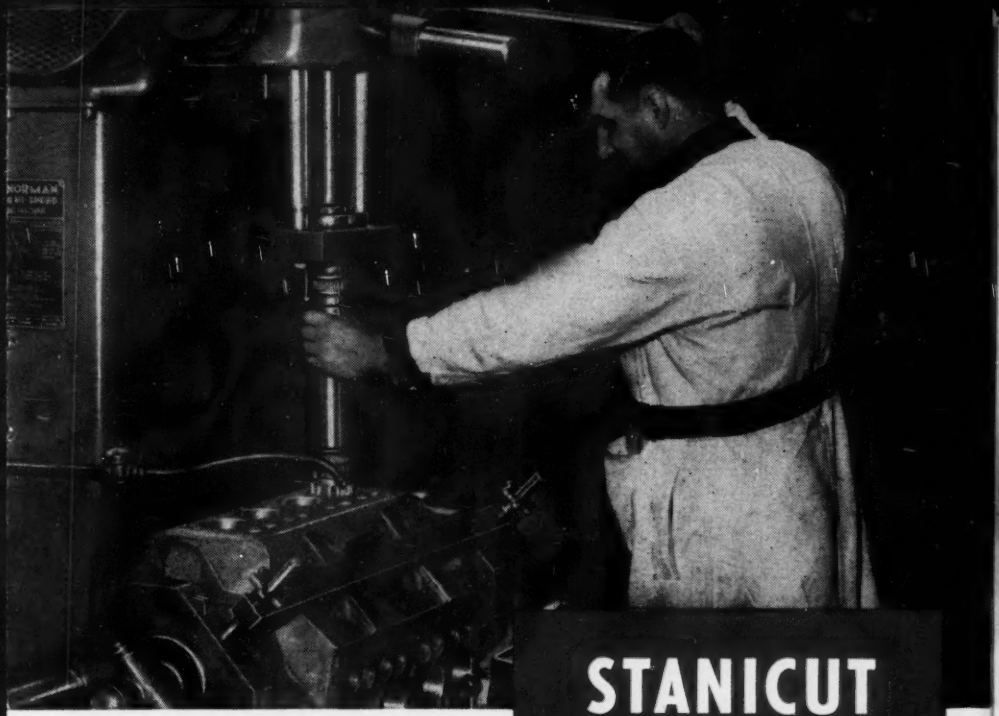
By Ira S. Roberts

A FEW years ago, titanium was a laboratory curiosity. Today, it is rapidly assuming the status of a structural material. This fact is made evident by the accompanying illustration showing two production parts to be used in the new giant DC-7 Douglas transport airplane. On the left is an exterior view of a DC-7 nacelle; on the right, the interior firewall section of another nacelle is shown. These parts are made entirely of titanium.

In designing the parts, titanium was substituted for stainless steel on a gauge-for-gauge basis. When finished, the titanium nacelles are said to be just as strong and 301 lb. lighter than their stainless counterparts. Douglas engineers point out that no serious fabrication problems were encountered during the construction of the nacelles shown. As a result, all nacelles on the DC-7's will be fabricated of titanium.

(Left) Exterior view of DC-7 titanium nacelle. (Right) Interior firewall section of titanium nacelle.





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A Standard Oil cutting oil specialist recommended STANICUT Oil No. 62 FC, a light-colored, light-bodied cutting oil. STANICUT has proved ideal for the job. The desired finish has been obtained on the cylinders. Tool life has been greatly increased. Oil consumption has been reduced.

Whatever your machining operation, the Standard Oil cutting oil specialist serving your area of the Midwest has the cutting oil that will meet your needs. You can get his help easily and quickly by calling your local Standard Oil office. Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

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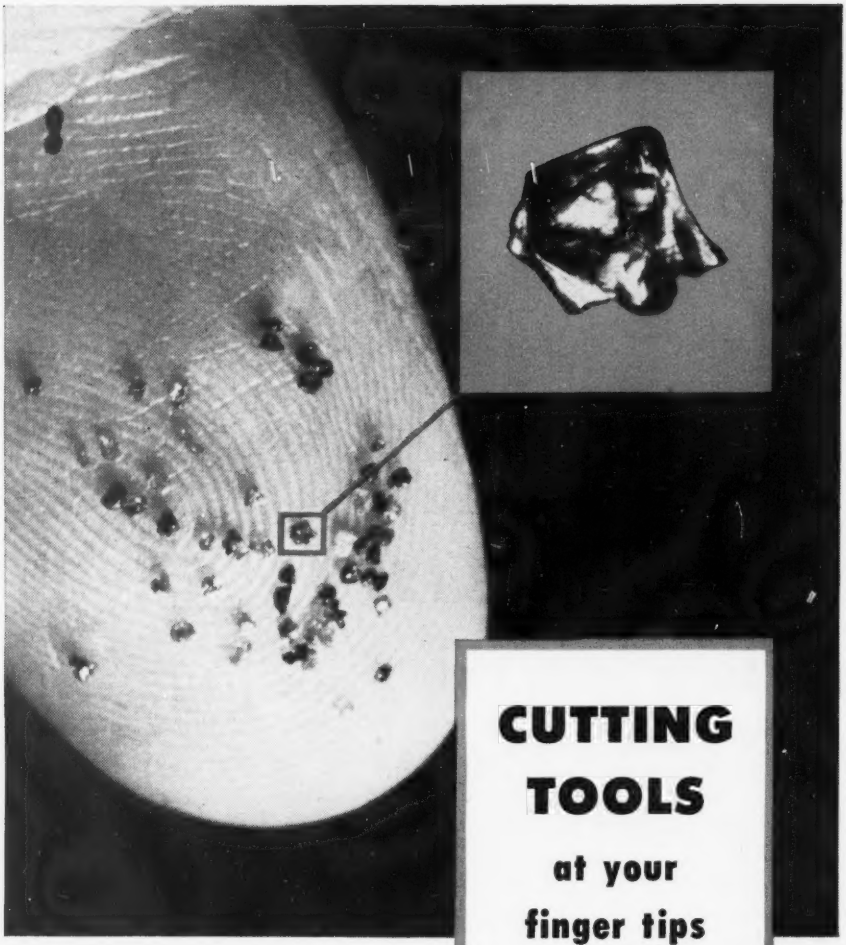

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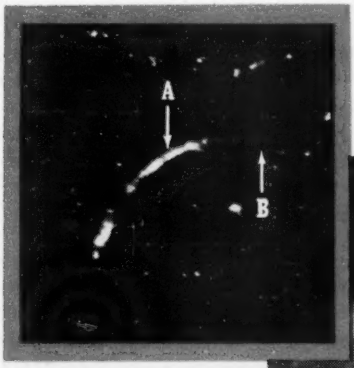
chips which agree in classification with the basic chip types found in other metal cutting processes.

This new concept is not based on hasty conclusions. It represents 25 years of Cincinnati Milling research, coupled with practical experience in applying the basic fundamentals of grinding to a wide variety of work on both centerless and centertype machines.

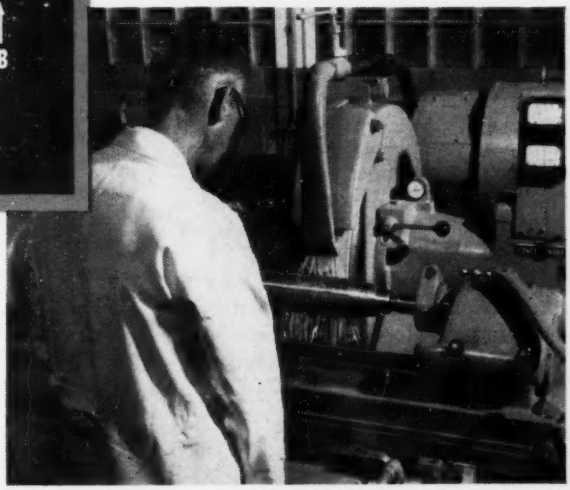
For you, this means grinding wheels developed and tested over a period of several years on the basis of true function—as true cutting tools forming true chips.

Available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, write, wire, or phone Cincinnati Milling Products Division, The Cincinnati Milling Machine Co.



◀ Ground surface of SAE 3145 steel showing partially formed chip (A) and groove (B) in workpiece from which material of chip was removed.

▼ Performance of experimental wheel is checked by member of research staff.



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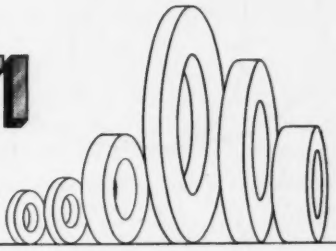

How Does Your Work Conform to Specifications? . . . By C. W. KENNEDY

A workpiece may be machined exactly to blueprint specifications and yet malformed for assembly purposes.

IN the February 1953 issue of this magazine some of the common errors in the use of gaging instruments were discussed. The article pointed out the surprising number of times that scrap, reoperation and rejections run high, to say nothing of assembly costs, because of the failure of the operator to measure his work correctly. The emphasis was placed on the misuse of measuring instruments due to hastiness, carelessness or plain ignorance of some of the fundamentals of measurement.

There are other factors, a sort of allied group, in connection with the conformance of product to specification, which are also perhaps too commonly forgotten, unrealized or deliberately ignored. They too add to scrap and rejection losses. They increase assembly costs, and often furtively undermine the reputation a manufacturer is trying to build or maintain for his products.

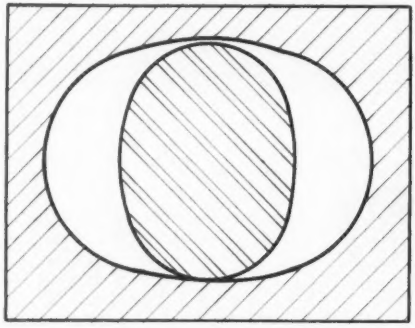

Fig. 1—Exaggerated drawing showing condition of a piston supposedly fitting a cylinder.

Out-of-Round

Wherever circular, cylindrical or spherical shapes are machined the most common of these unwanted characteristics is out-of-round or, as the British perhaps more aptly term it, ovality. A dictionary might define it as the total radial variation from a true circle. Furthermore, probably nothing circular, cylindrical or spherical is ever machined that comes out perfectly round.

It may seem trite to review such a well known condition as out-of-round but it is apparently necessary to accept its inevitable existence. For greater perfection in parts or product it should be more than acknowledged; something should be done to control it. Its ill effects are most usually noticed, of course, where parts are mated, where a shaft is supposed to fit a bearing, a plunger or piston to match a cylinder, as suggested in the exaggerated diagram in Figure 1. In precision ball bearing manufacture, for exam-

ple, it has been found difficult to control out-of-round closer than 25 millionths and even this miniscule deviation from the true sphere or circle is enough to cause more noise, vibration, wear and short life in ball bearings than their makers want.

Some plants ignore or justify out-of-round on the comfortable, complacent, but mistaken basis that the mating parts will wear in together. There will naturally be some burnishing down and some wear between shaft and bearing or between plunger and cylinder, but there is no wearing in together in the sense of greater snugness of fit. The shaft or plunger may wear down from oval to round but the hole can do nothing about shrinking itself into the proper size true circle. In fact, the wear is more often in the direction of the original error rather than toward the tendency of neutralizing it. An out-of-round shaft in an oval bearing tends to wear the bearing more egg shaped. Those who make oil injection pumps and hydraulic valves realize, from the percentage of leakers at the final high pressure test, the fallacy of the wearing in philosophy. Where moving parts are assembled in ultra high speed apparatus, where R.P.M.'s from 30,000 to 100,000 are involved for instance, the wear condition implied is accentuated because of the additional centrifugal thrust the ovality can cause.

The well known triangular out-of-round, or clover leaf pattern, presents its own particular difficulty, in addition to the wear effects just mentioned, where assembly tolerances are close. It has become much better known that a centerless ground piece is quite likely to come out in the form of the solid line in Figure 2 rather than as a true cylinder as illustrated by the dotted line. Suppose the blueprint specifies a true circle of diameter **A.** The centerless ground piece, measured with any **two** point caliper or goal across any axis, will show a diameter **A'**, which,

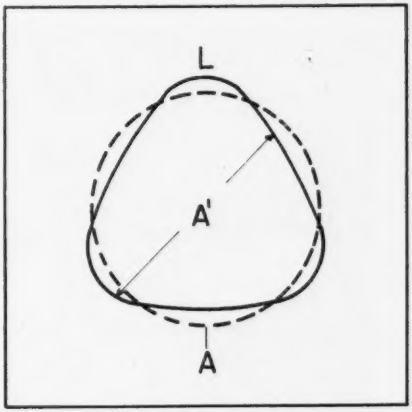

Fig. 2—Exaggerated drawing which illustrates triangular out-of-round phenomenon.

as far as the reading is concerned, can be the same as the specified, true cylindrical diameter **A.** Because of this peculiar, triangular out-of-round phenomenon, the operator is deceived into believing the diameter of his work is correct, yet the shaft will not assemble in a hole whose diameter is **A** because of the interference of the lobes, **L,** as Figure 2 indicates.

Out-of-round presents another manufacturing difficulty which resembles some inherited human characteristic. Once it is introduced it is hard to get rid of. Take the piece that is drilled and reamed in an automatic. If the hole comes out oval in this original operation, the degree of that ovality may be reduced in subsequent internal grinding, honing and lapping operations but it is quite unlikely the pat-

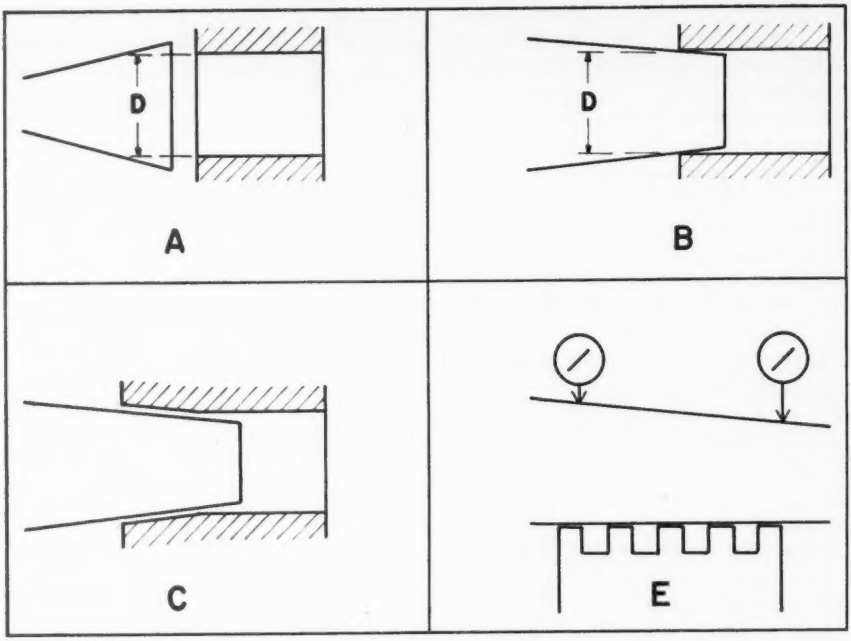

Fig. 3—Sketches illustrating conditions ordinarily encountered from taper in workpiece.

tern of ovality will ever disappear. If the original bar stock itself is out-of-round, the chuck or collet will pick up the pattern and transfer a degree of it to the boring and reaming cut. The place to lick out-of-round is where it originates.

One reason why out-of-round conditions are often ignored is because conventional measuring methods fail to disclose them readily. It is just about impossible to detect ovality with standard fixed snap gages, nor will the ordinary plug gage readily disclose a misshapen hole. With standard micrometers and vernier calipers the worker will make one measurement to check diameter. It takes too long to measure again 90 deg. around the periphery or to explore for ovality.

It is being discovered and admitted that out-of-round is a pertinent cause of product unreliability and a definite source of increased assembly and product service cost. Simultaneously, alert manufacturers are turning to the use of indicating gages for the one purpose at least of trying to eradicate the deformity of ovality in their piece parts. More and more blueprints are specifying allowable out-of-round limits in terms of maximum indicator reading in addition to tolerances.

Time and motion study and methods engineers are imposing standards in an operation cycle not only for snapping pieces in and out of indicating gages to check diameter but also for that short time element that allows the operator to turn the piece 90 deg.

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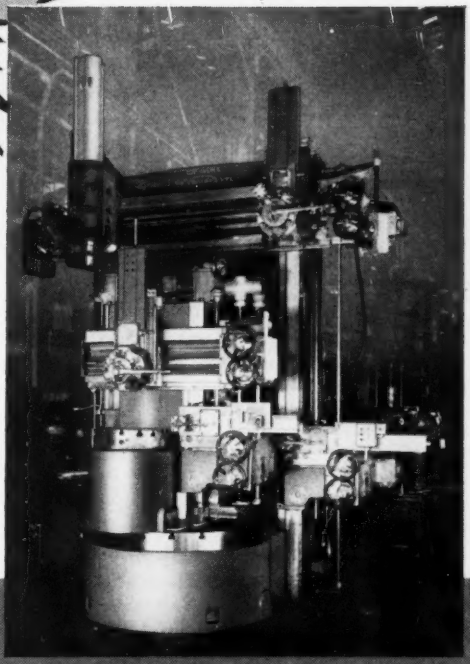
Six specific sizes 30-36-42-54-64 and 74 inch with extra high beds when required.

Shown here is the 30 inch machine comfortably nestling on the table of a 74 inch high bed machine. There was no fear of spindle bearing damage or bed deflection even with this 26,000 lb. load. Proof of confidence in the rugged construction of Bullard Cut Masters.



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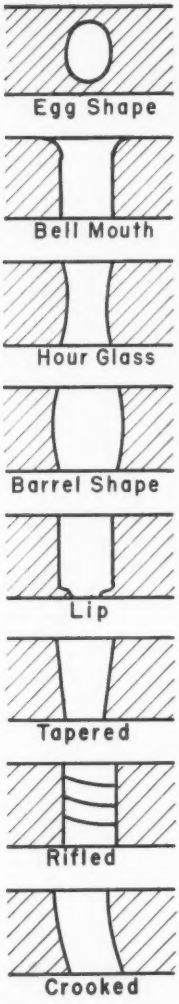

Fig. 4 — Sketches illustrating variety of conditions revealed by indicator hole gage explorations.

in the indicating gage and observe its ovality. Where production quantities and speeds warrant it, indicating gages are made with indicators locating at 90 deg. points on the workpiece so that ovality can be measured in a single gaging motion. While a ring gage will reject for excess lobe out - of - round from centerless grinding, it is usually detected by revolving the workpiece in a Vee block under an indicator or faster by designing a gage with two indicators 60 deg. apart or still faster by slipping the workpieces through a three jet air ring.

Taper

Taper is another close relative in the menage of machining deformities which bedevil the parts and products that manufacturers try to make. Like out-of-round it is nearly impossible to overcome or eliminate consistently. Its effect on assembly and the ultimate success or failure of the assembled product is outlined in exaggerated fashion, as a matter of review, in the sketches of Figure 3.

Back taper, of course, can cause definite interference and usually rejection at assembly as sketch **A** in Figure 3 pictures. The operator may have checked the workpiece diameter at **D** and felt satisfied, but if he failed to measure again at some other location along the workpiece to detect taper, the assemblyman is in trouble with that piece. Where front taper is ignored, a condition similar to that portrayed in sketch **B** of Figure 3 makes trouble soon by quick wear, looseness, vibration, end play or noise. Again, a tapered shaft may wear itself into a bearing as sketch **C** intimates but soon introduces the effects of binding, wedging, friction and "freezing."

Taper on an O.D. is hard to detect with a fixed snap gage, or with a plug in an I.D. Its possible presence in frequently neglected because two measurements must be made in the length of the workpiece, which take time and effort if conventional micrometers or vernier calipers are the only equipment available. Again, the indicating gage comes to the fore where taper is a problem because the workpiece can be quickly moved along in the gage and the swing of its indicator hand speedily discloses the amount of taper. For still speedier gaging, indicator gages are made up after the fashion indicated at **E** in Figure 3 where a single gaging motion shows the taper by the immediate difference between the pair of indicator readings.

When a machining department first swings to indicating bore gages, even those who felt strongly that control of

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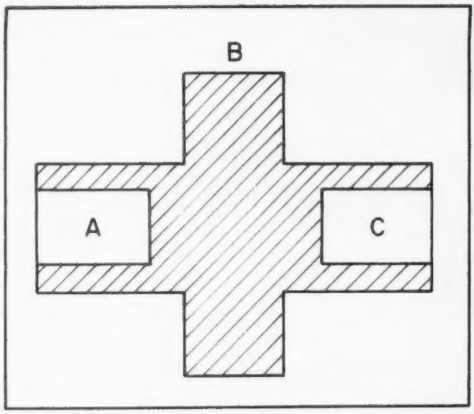

Fig. 6—Sketch of coupling device requiring accurate boring of concentric holes.

hole size within the limits of go, no-go plug gages was not enough are surprised at the conditions discovered from drilling, boring, reaming and internal grinding conditions. Figure 4 displays the conditions indicator hole gage explorations bring to light. Sometimes the deformities appear singly; often in combinations.

Until indicator gages are brought on to the job so that an operator can see what is happening inside his work and consequently intelligently proceed to correct the defects, the matter of getting close fits which will last any length of time in ordinary service is largely a matter of blind luck. The internal conditions of small holes have been especially neglected perhaps because, for one reason, it has been hard for many mechanics to believe that ordinary drilling and reaming does not produce a reasonably perfectly shaped hole. The knowledge of small bore internal conditions, the willingness to admit them, the knack of overcoming them, were part of the craft secrets of the old time gunsmith. Then, too, until lately, few have known that successful indicator gages can be secured for hole sizes down to 0.0125 in. and, more recently, air gage plugs down to about 0.050 inch.

In a fairly recent situation, a manufacturer was required to make and assemble a gear train of some eight gears for a computer device in which the total backlash of the train was not to exceed 0.001 inch. Trouble shooting finally focussed on the center holes or bearings in the gear blank hubs. No one believed, at first, what was dis-

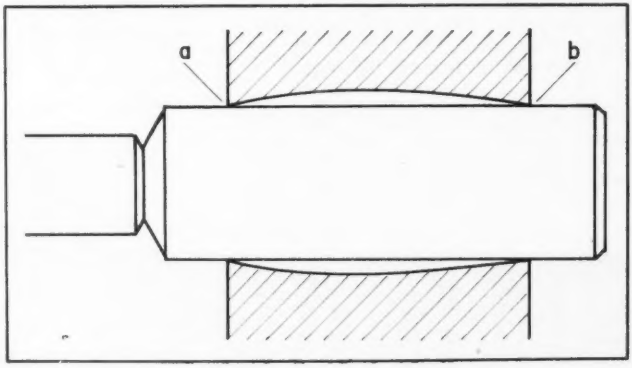

Fig. 5—Sketch illustrating barrel shaped hole obtained by grinding operation on a supposedly precision internal grinder.

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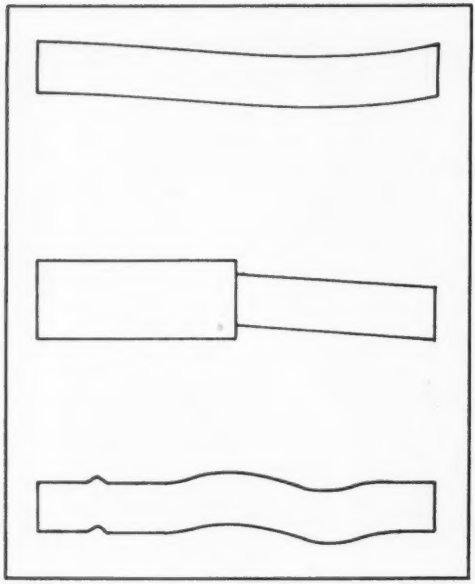

Fig. 7—Sketches showing various conditions, in exaggerated form, that are classified runout.

covered with indicator gages and air gages—that grinding these I.D.'s on a supposedly precision internal grinder could produce barrel shaped holes. Plug gages fitted exactly the diameters at the relatively sharp edges of these barrel profiles—see **a** and **b** in Figure 5—and a snug assembly to the shaft was accomplished. But edges **a** and **b** wore down rapidly with a few turns of the gear and, shortly, the gear was loose enough on its shaft to upset the overall tolerance for gear train backlash and looseness.

The gear assembly just mentioned also brought, of course, the question of controlling concentricity. In this case it was especially essential to have the gear holes and the gear teeth pitch circles closely concentric with each other. Runout of even a tenth or two could find and stall an otherwise free running, sensitive gear assembly.

The out-of-round error applies to any single diameter; concentricity enters the picture as soon as multiple diameters appear on one piece. Like out-of-round, the effect of eccentricity—the lack of concentricity—is often overlooked or ignored. And further like out-of-round, this laxness toward keeping diameters suitably concentric adds to filing, fitting and lead hammer charges in assembly departments, to say nothing of its downgrading effect on the final product. The successful noise-free, vibration-free and wear-free operation of

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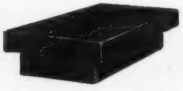

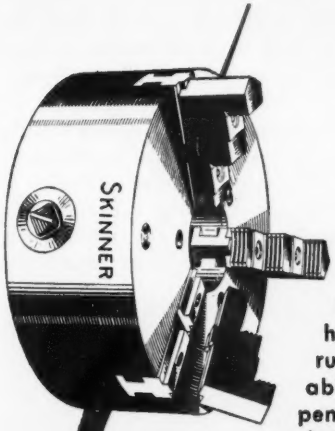

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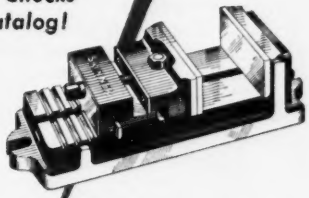

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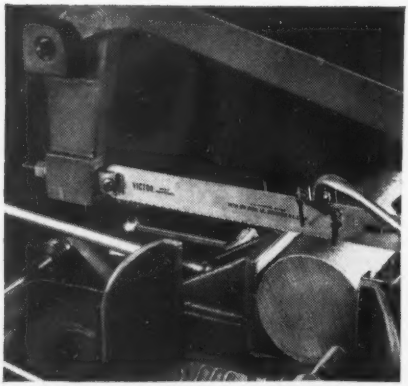

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most moving assemblies, from electric shavers to locomotive gas turbines, depend as much on maintaining concentricities as on holding actual dimensions.

An excellent example of machining concentric holes appears in the coupling part roughly outlined in Figure 6. Generally speaking, it consists of a flange section, **B**, and two blind holes, **A** and **C**, into which drive shafts are

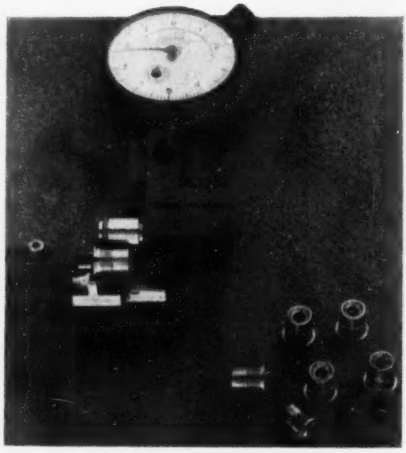

Fig. 8—Illustration showing gage which was designed to check the runout of threads.

assembled. The smooth running and life span of the mechanism, of which this coupling is a part, depends less on maintaining diameters **A, B** and **C** (even some ovality could be tolerated) but the center lines of holes **A** and **C** just about have to line up with each other and with the center of diameter **B**. Otherwise, the rotating assembly whips and vibrates intolerably. The coupling looks simple on paper but any machine operator can appreciate the headaches involved in boring blind hole **A**, reversing the piece, and then trying to bore another blind hole, **C**,

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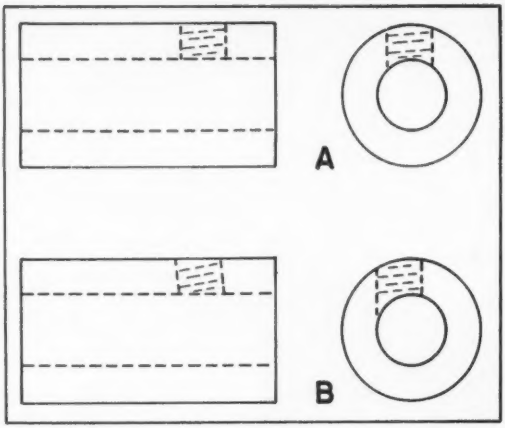

Fig. 9—Sketches at A show tapped hole as it appeared on draftsman's drawing and sketches at B illustrate how hole might appear on completed job.

perfectly in line with the first hole buried back there in the forging.

An operator needs indicators, test sets, mandrels, Vee block equipment and probably special design indicating eccentricity gages right on the spot if he is expected to machine diameters concentric with each other.

Runout

In the family of ovality and eccentricity you will find another manufacturing offspring which gets usually even more scant attention than the other two. All of them are frequently clumped together in shop language under the general term of runout. In particular, this third element of defectiveness affects shafts, rods, spindles and the like. It takes the form of a bend, bow, crook-

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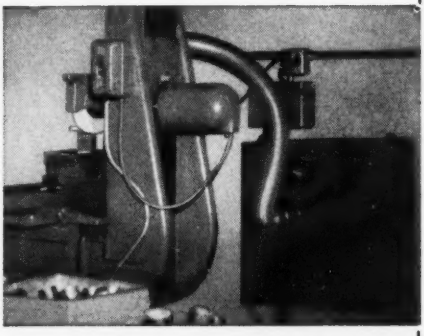

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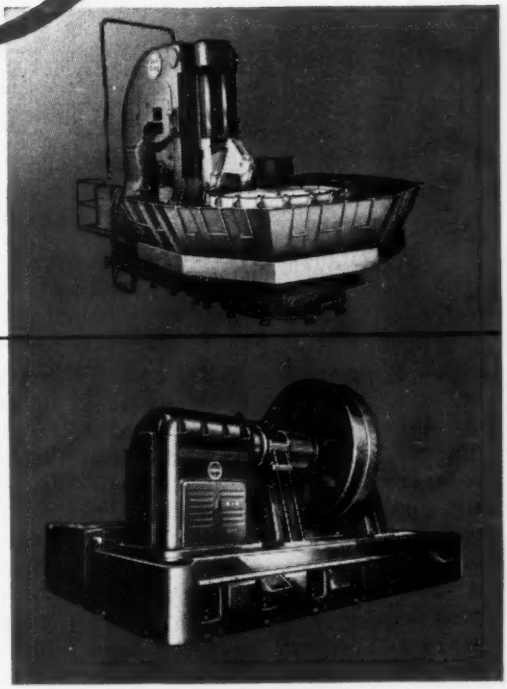

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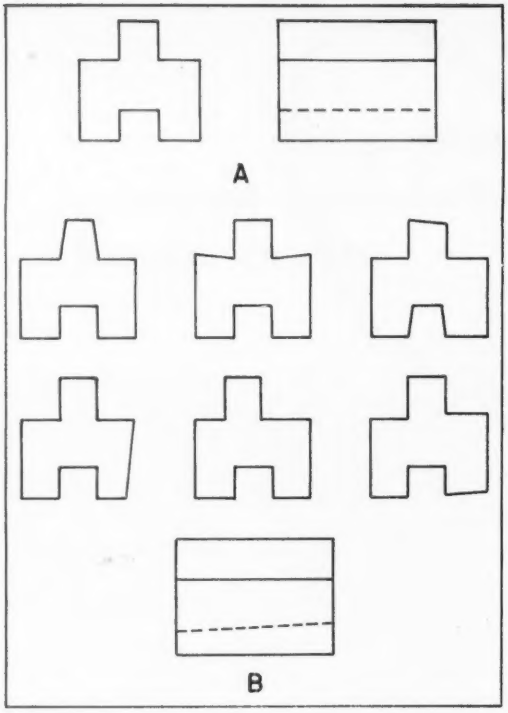

Fig. 10—Sketches at A show block-like workpiece requiring milling. Sketches at B serve to illustrate possible conditions encountered during actual milling of piece.

edness or waviness.

Some of its manifestations appear in the partially exaggerated diagrams of Figure 7. We are too often accustomed to feed bar stock or rod into a machine and turn out shafts and spindles to the correct diameters, all the time assuming that either the original stock is straight enough or that by trimming metal off it we shall automatically correct any dips, bumps or curves. If the spindle is fairly long and slender, it is not impossible for it to get a bend or two from the cut. Shafts are often bent trucking them from one operation to the next. What Figure 7 implies could well be worth looking into when assembled mechanisms fail to go together and revolve as smoothly as the book says they should.

Lately, runout has been added to the list of thread elements like pitch diameter, thread lead, thread form, major and minor diameters, that need to be checked in order to secure the kind of modern threaded assemblies that are required to lock tight, take the strain without stripping, and withstand vibrations. It is being found that running a thread die over a piece sometimes produces or accentuates runout. The gage pictured in Figure 8 was designed to check the runout of threads on workpieces which, when screwed head on into other cylindrical parts, would revolve closely concentric with their mates in the assemblies.

Errors in form or shape are by no means confined to turning operations, as we know. Machine hands in other departments run up against conditions that have been called implicit in the drawing. As an example, look into drilling and tapping set screw holes and matters of hole location and direction to find another commonly unwatched condition that frustrates the assembler and contributes to the moral decline of the repair man who is often its ultimate destination. Drawing **A** in Figure 9 pictures the way draftsmen said the tapped hole should be and shows a choice of how the mechanic often brings them forth.

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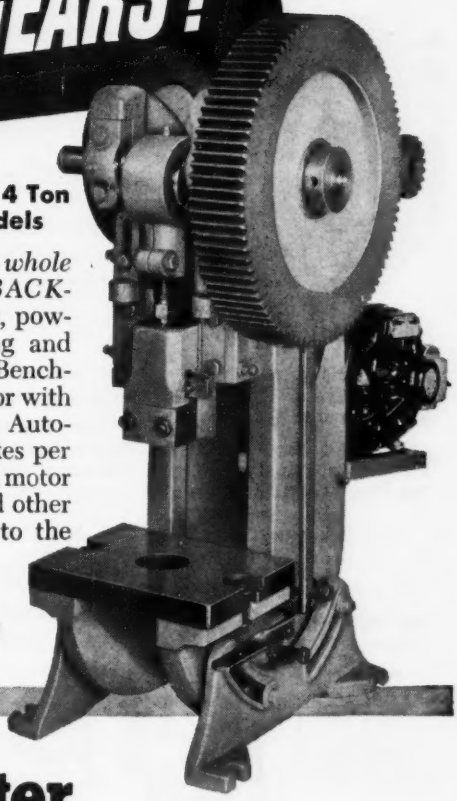

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A in Figure 10 shows a sketch—two views of a block-like piece with a rib on one side and a channel cut in the other end. Everything about the print is pretty—exact, square, centered and parallel. Sketches **B** of the same Figure 10 shows some of the conditions (again a trifle exaggerated of course) appearing in the parts actually produced. The pictures tell their own story.

Because a blueprint shows a true circle or a square corner doesn't in itself bring out that kind of product. A casual glance at the parts may make them seem to look properly round or square. It takes measurement of the right kind to show up the little discrepancies that may make all the difference in the world between the **A-1** product and a product of the type that may have to be disposed of eventually at cut rates.

The man who lets himself get bogged down in a multitude of details seldom gets his head above water long enough for the far look to where he is going. This is a very true fact. But the professional secret of the leader in manufacturing is knowing just what to look for and where and when.

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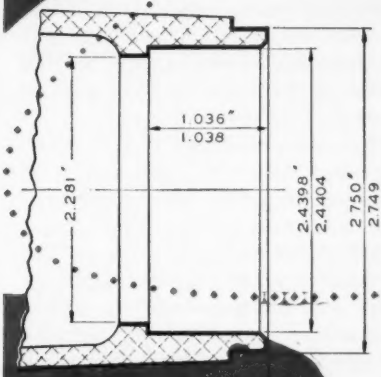

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How to Handle Shop Grievances . . .

By Robley D. Stevens*

The author explains how the recent growth of industrial organizations has placed emphasis on the foreman in solving employee disputes.

THE foreman in any machine shop has two primary jobs: (1) get out production and (2) supervise—to get workers to perform their best work. The foreman has traditionally been classified as a part of operating management. The employees consider him the boss, if not the absolute monarch, and view him as the basic embodiment of the managerial structure. His authority over the workers is rarely questioned if performed in accordance with good, sound industrial relations practices. He plans the work in a machine shop, sets the pace, determines the method to be used, trains new employees, figures costs, and so on.

Collective bargaining has had a tremendous influence on the status of foremen, meaning that petty grievances can be costly to machine shop management unless controlled. The foreman's lack of understanding and resolving grievances needs enumeration. In the first place, a foreman must obtain the cooperation of his men to adequately administer his department. Maintaining discipline is essential to improved efficiency. Therefore, the foreman should be expected to prevent grievances and to handle grievances that arise.

To accomplish such aims, the foreman in a machine shop should be well acquainted with company rules, policies, and union contracts if any. Is he familiar with your machine shop grievance machinery? Through lectures and printed information, the foreman can handle machine shop grievances accordingly.

Some exponents say the foreman should resolve them, others say no—depending upon who the foreman is. Thus, the burden is placed upon machine shop management itself. However, it is reasonable to conclude that if a foreman cannot aid in solving grievances, he ought not to be a member of the managerial structure.

What is a grievance? Well, a grievance may arise from any number of causes which affect the mental attitude and morale of the worker toward his job. Psychologists are agreed that the cause may be real or imaginary. In any event, a grievance can lead to considerable dissatisfaction between workers and management. However, getting at the underlying conditions which give rise to grievances is essential in the machine shop.

What are some typical examples of worker's grievances? For illustration they might include: The worker feels

* Management Consultant

that he is not getting what he is worth; his job is worth more than it pays and might be classified; his piece rates are too low; the foreman doesn't like him and picks on him; his mistakes were due to inadequate instruction; the foreman ignores complaints; time-study men do too much snooping; he hasn't received all the seniority due him; he doesn't have a chance to advance himself; toilet facilities are inadequate; the company won't grant the foreman authority to grant concessions; etc.

Regardless of the allegation of worker's grievances in a machine shop, they ought to be settled promptly. Generally speaking, mutual suspicion is replaced by good faith with the handling and solution of worker's grievances.

Since collective bargaining is a two-way street, management may at times have a just cause for bringing complaints against the union or against an individual employee. Thus, grievance machinery is essential for obvious reasons. After all, machine shop management might have these typical examples of grievances: disregard for plant rules; disregard for supervisor's orders; slowing down for time studies; poor work; company thinks that the union spends too much time on grievance work and misrepresents management's attitude toward new employees; and so on.

Let's use some common sense in solving grievances. More specifically, let's go back to the source. If a foreman in a machine shop will analyze the cause of grievances, no doubt he will find that many of them are absolutely unfounded. However, if the weakness of complaining can be corrected, the foreman should discuss the matter tactfully with both workers and machine shop management. On the other hand, as in all human relationships, it is better to leave some things unsaid.

A grievance can be reduced to writing. If the aggrieved employee is not satisfied with the foreman's decision, the case can be submitted to machine shop management and union officials if any are involved.

What information would be most useful? Well, general facts should be gathered, including information about the aggrieved employee such as name, address, badge or clock number, department in which employed, and union number if any; statement of the grievance; clause of the contract which may have been violated; request for adjustment; and signature of aggrieved employee. Such data are useful for evaluation.

For example, how would your foreman handle a grievance involving a pay shortage? Machine shop worker Number 100 was recommended for an increase in pay on June 31, 1952. He should have received same on the pay period ending July 11, 1952, but did not. Why the delay?

Perhaps the following sample grievance report might be used by machine shop management accordingly:

NAME OF COMPANY

Name of Union — Local
Name of aggrieved employee — Clock No.
Foreman or supervisor
Employee's statement of grievance
Date presented to foreman
Signature of worker
Foreman's answer
Signature of foreman
Submitted to machine shop management (official)
Disposition of case

Recently, a foreman asked me this question: How long should it take to settle a grievance? It all depends upon the nature of the grievance and also how it affects management-labor relation. Of course, nothing is more important about grievance settlement than promptness. The time limit works both ways. It might be an hour, a day, a week, or a month, depending on many factors. Speedy adjustment of grievances pays off in the long run.

Grievances involving production standards, incentive wage plans, and job classifications could be handled through arbitration. The bringing in of outside counsel as an impartial umpire in resolving grievances is considered good judgment. On the other hand, the foreman in a machine shop ought to be sufficiently competent to solve most grievances if a contract of a union or the regulatory laws involved have not been violated.

Generally, machine shop management grievance procedure machinery should produce good results when undertaken in a cooperative and constructive spirit. The psychology behind resolving a grievance entails promoting mutual welfare, securing justice, and eliminating the conditions which give rise to employee grievances. Thus, a case settled on its merits in the long run should prove of the best interest to both parties. Table pounding is not a good approach for settling grievances. Rather, the sub-

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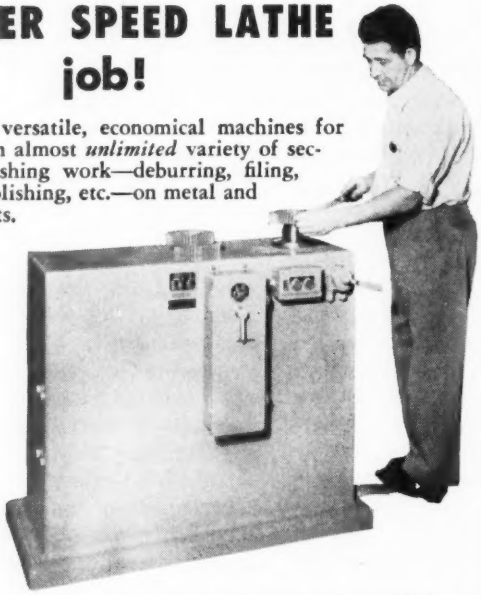

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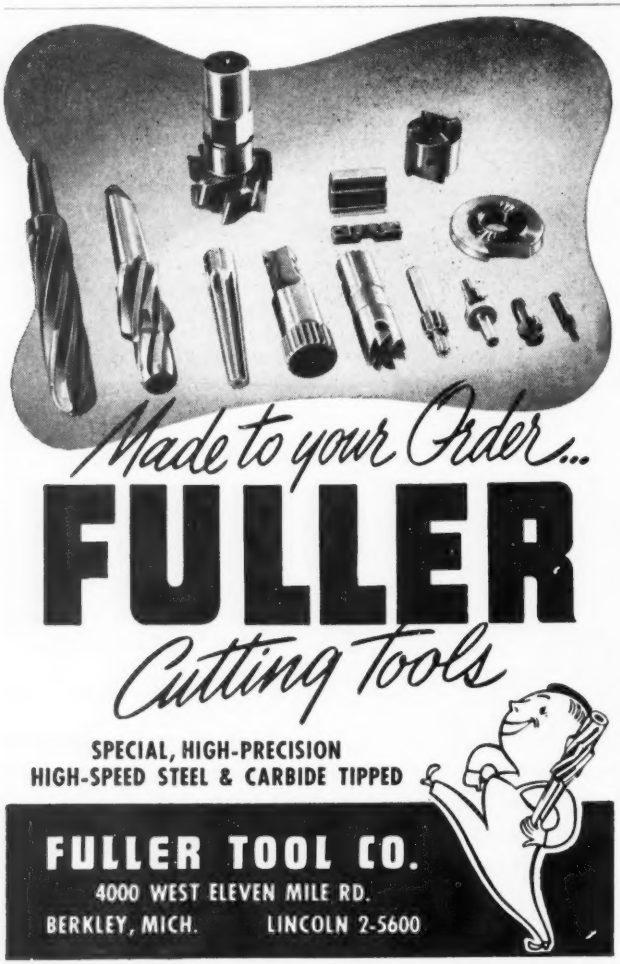
mission of concrete evidence should be taken into consideration.

It is generally agreed that no individual in the machine shop is more important to good labor relations than the foreman. Yet, a foreman's role in aiding in resolving grievances ought not to be overlooked for numerous reasons. His prestige suffers, and consequently his ability to control production, if he is ignored in the handling of grievances. Naturally, a foreman cannot be expected to settle every grievance satisfactorily. For this reason, machine shop management ought to establish grievance machinery to handle grievances accordingly.

If the industrial or personnel department cannot find a solution to grievances, then top management of a machine shop should intervene. On the other hand, a Grievance Committee should be established, which can be comprised of the business agent of a union, the steward, an executive of the machine shop, and so on.

Appeals of decisions of grievances at the lower level should always be evaluated for obvious reasons. Regular meetings by management are considered worthwhile for the purpose of settling grievances. Thus, the importance of conducting grievance meetings as efficiently and expeditiously as possible cannot be over-emphasized in the machine shop. To obtain



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gives both
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With the Full Floating Holder, another of the Erickson family of Precision Holding Tools, work and cutting tools may be quickly and easily adjusted to offset machine errors.

This Precision Holder compensates for *both* parallel and angular misalignment with the work spindle through the use of mechanical principles never before utilized in any floating holder.

Designed for floating reamers, taps, die-heads and all other chuck-held cutting tools, the versatile Erickson Full Floating Holder will help you increase production, reduce scrap, and lower tooling costs.

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Catalog B: *Adjustable and Full Floating Holders*

Catalog C: *Precision Tap Chucks*

Catalog D: *Speed Chucks and Air Operated Cylinders*

Catalog E: *Precision Expanding Mandrels*

Catalog F: *Speed Indexers*

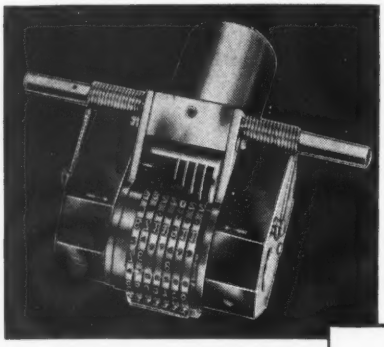
Catalog G: *Boring and Reaming Tools*

ERICKSON TOOL COMPANY
2303S HAMILTON AVE. **CLEVELAND 14, OHIO**

adequate results, good planning is essential. Efforts to confine discussion to the specific cases on hand and to avoid general arguments are important. The average foreman can figure this out himself as to why.

There are probably a thousand reasons why machine shop management should have adequate grievance machinery, among these being to keep production going and eliminate low morale. The ability of a foreman to solve grievances is essential. Without this useful "know-how," the foreman cannot find a solution when confronted with an employee's grievance.

Finally, staff meetings of supervisory personnel in a machine shop on the technique of settling grievances can pay off in more ways than one. Exactly how should the foreman go about this business of resolving grievances in a machine shop? What procedure should the foreman follow in settling employee grievances? Questions like these by supervisors show an understandable desire to solve them and to seek specific instruction. But an answer that fits all situations cannot be given. Machine shop management must decide.



Numbers...
FROM 1 TO
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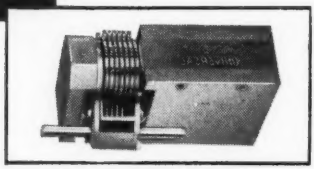

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these new Parker numbering heads for punch press stamping come in four to ten digit models and stamp consecutive or repeat numbers cleanly and sharply into the most rugged stock. A simple duplicating attachment can be added if required and a compound numbering head can be manufactured to your specifications to embody a trade mark, name or group of symbols to be stamped in one operation.
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Overall Height 7'

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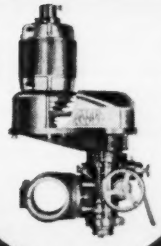
FRAY "ALL-ANGLE" HEAD TYPE 4



For deep, heavy cuts. Permits working to extra close limits. Any angle up to compound 2-way. Request Bulletin 4.

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They (1) can drill practically any number of holes at one pass, up to 600 or more; (2) can drill any material; (3) can drill in any pattern; (4) can "come down to" distances between holes as small as twice the drill diameter; (5) can and do maintain accurate spacing. Zagar gearless drillheads can be furnished as complete units or can be adapted to any standard drill press. Your parts drawings and full data will bring you a prompt quotation.

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Zagar TOOLS For INDUSTRY and SPECIAL MACHINERY

The foreman who grasps the principles for handling grievances can, as a rule, successfully handle them; but the foreman who ignores them is sure to have trouble. Employees tend to develop and grow when they know that their grievances will be solved on the merit of the case involved; also when, through the efforts of their foremen, they gain reasonable satisfaction arising from just grievances.

To the mature foreman, the settling of machine shop grievances enables him to have a part in the growth and promotion of better labor relations. Progressive machine shop management does not blame the foreman for grievances in his department but rather judges him on how effectively he handles them and whether or not he is trying to eliminate their causes. Don't wait for grievances!

"It really wasn't necessary to add your measurements to the application blank."

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BUT YOU MUST FIT THE TOOL TO THE JOB

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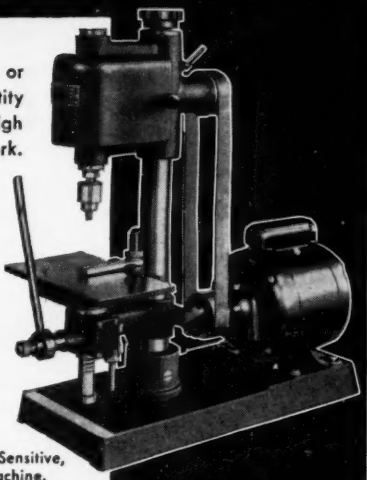
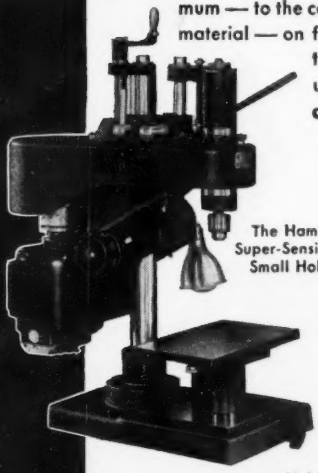
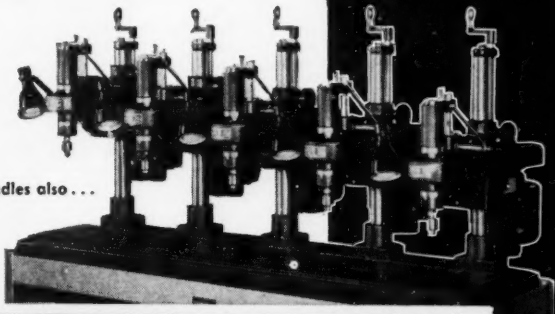


The HAMILTON® Super-Sensitive, Small Hole Tapping Machine.



The Hamilton VARIMATIC® Super-Sensitive, Variable Speed, Small Hole Drilling Machine.



Multiple spindles also . . .

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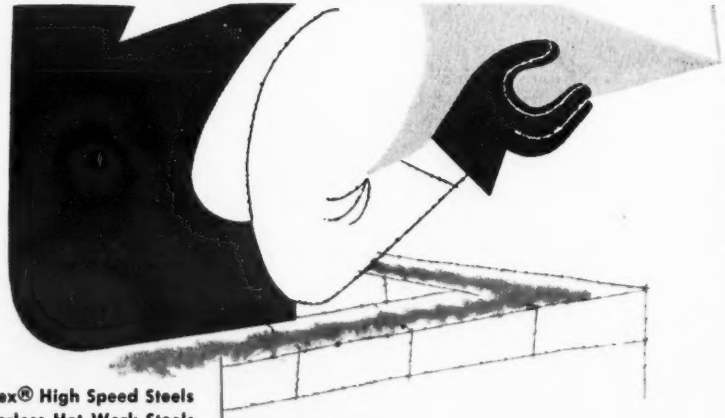

or the general supply and demand situation. During last year's steel shortage, for instance, all our customers had their share of our production.

You too, can benefit from our long experience in this field through our freely available metallurgical service . . . and from our reliable delivery service through our fully stocked warehouses, conveniently located all over the country.

SEND TODAY for the unique Crucible Tool Steel Selector — a twist of the dial gives the tool steel for your application.

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Case History No. 4 Machining Stainless Steel

By G. J. STEVENS*

Case No. 1

Product: Small tapered needle valve.

Operation: Plunge-grinding Armco 17-7 PH stainless steel, 0.125-inch diameter, Condition C (or CH).

Solution: Three changes in practice were recommended for longer wheel life and greater production. (1) The collet holding the part in the valve grinding machine required too much overhang. A special collet (see sketch) corrected this condition. (2) Plunge grinder was modified to increase spindle speed from about 30 r.p.m. to 1,000-2,000 r.p.m. This was done with a small electric motor with belt drive. (3) Crush-forming was used to shape the grinding wheel. Better results were obtained in this instance with a diamond point controlled by a formed cam.

Case No. 2

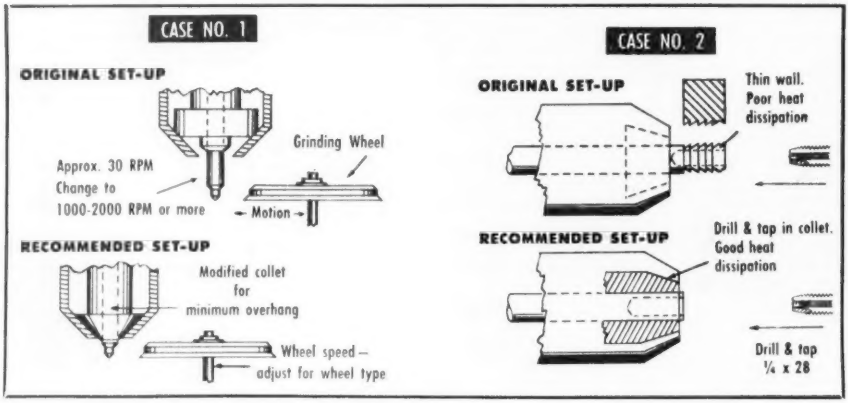
Product: Valve seat.

Operation: Forming, drilling, and tapping Type 303 stainless steel.

Problem: Poor threads from excessive chip pickup in tap flutes.

Solution: In the first setup, the work was fully extended from the collet, and drilling and tapping were done while forming. This was too much machining at one time on the thin-walled part and prevented elimination of excessive heat. To improve screw threads, the machining engineer recommended drilling and tapping the bar while it was still inside the chuck where heat was readily conducted through the collet. Then, the bar was moved out from the collet for forming and cutting off.

* Machining Engineer, Armco Steel Corp.



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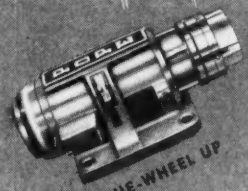

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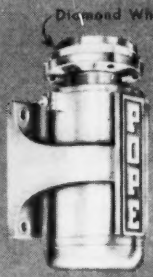
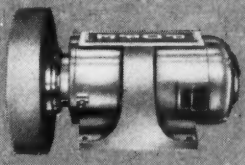
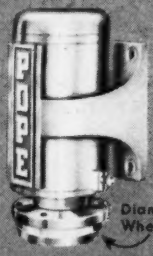


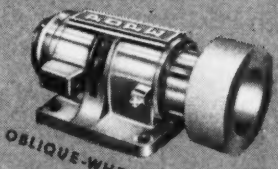
VERTICAL-WHEEL UP



HORIZONTAL



VERTICAL-WHEEL DOWN



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BUILDERS OF PRECISION SPINDLES

No. 93

What Tool Engineers Discussed In Detroit

In view of the widespread interest in the subjects discussed at the recent meeting of the American Society of Tool Engineers in Detroit and for the benefit of those who were unable to attend, we take this opportunity to present herewith the highlights of the papers which were presented at the meeting.

MOTION PICTURE FILM AUTOMATICALLY CONTROLS ENGINE LATHE. In emphasizing that the tendency toward greater use of automatic machine tools is on the increase, Julius Y. Kaplan, Head of Servo Section, ARMA Corporation, Subsidiary of American Bosch Corporation, Brooklyn, N. Y., described a motion picture film that automatically controls a lathe.

J. Y. Kaplan

The Brooklyn production expert said, "There is a considerable gap between the completely automatic factory of the future and our present day factories." Use of automatic controls will release labor for other skilled work necessary to maintain the plans to production to marketing process.

He said automatic factory controls would enable the operation of machines at the highest efficiency of their tools and provide smooth and rapid transition to new product manufacture.

NEGLECTED APPROACH TO SAVINGS. Terming the study of the microstructure of metals a "long neglected" approach to savings, Norman Zlatin, Partner in Metcut Research Associates, Cincinnati, stated that production is often hampered because of variations in the machinability characteristics of steel parts although the compositions and hardness of the steel parts are identical. Cause of these variations which wear out tools, cause scrap parts and slow production, he said, is the different microstructures in the steel that can result from the type of heat-treating procedure.

Norman Zlatin

Machinability ratings of metals are currently based on their composition and hardness with no regard to the microstructure, Zlatin said. He termed this a neglected approach to savings which industrial metal working plants could effect. "In the future as costs are examined more carefully, greater emphasis will be placed upon using heat-treating operations designed to give the best microstructure for machining," Zlatin concluded.

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AVOID CREATION OF A MONSTER MACHINE. There really is no design limit to the number of operations that can be combined into one industrial machine tool but there is a danger of creating a monster machine so complicated to maintain it defeats its own purpose economically according to Ralph E. Cross, Executive Vice President of The Cross Company, Detroit. He cited an ASTE survey made in 1952, in which a great majority of tool engineers declared they wanted improvements in machine tools that would reduce down time. He said the answer to their desires was increased design study with proper consideration of the time involved in changing tools on the machine.

R. E. Cross

After outlining a method by which this design study can be carried out on present machines while they are operating, Cross emphasized that an important result of such studies has been the development of new methods and mechanisms by tool engineers that reduce down time. "Improvements in this field have increased machine efficiency as much as 25 per cent," he said.

UNCONVENTIONAL MACHINES FOR PUSH BUTTON FACTORIES. Discard conventionalism to make room for unconventional machines and methods to develop an automatic factory was the challenge given by Otto C. Turchan, Director of Research and Development, Turchan Follower Machine Company, Detroit. Tracing the history of the development of automatic controls in production, Turchan declared the "future depends upon how we meet this challenge."

"Fully developed, the automatic factory will definitely have a control system consisting of an information center, feed-back controls on each machine and an automatic inspection quality control of the end products. The actual work will be performed by automatic machines having feed-back controls operating to the demands of the information center," Turchan said.

To make these factories a reality, Turchan said men must be trained as control - system engineers with advanced work in mathematics, physics, chemistry, measurements, communications, electronics, servomechanisms, energy conversion, thermodynamics and computational techniques. He termed this a "real challenge" to our educators and industry.

O. C. Turchan

METAL SPINNING. Despite all the industrial advances of recent years, the centuries old process of spinning is playing an important part in today's vast metal working field, according to John W. Lengbridge, Project Engineer at Aluminum Goods, Inc., Toronto. The Canadian engineer evaluated spinning in comparison to drawing of metals. He said the process which is thought of primarily in connection with pottery or working with clay is a valuable asset in metal working.

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Although drawing of metals, a modern industrial development, is normally more applicable for many of today's processes he said, spinning had proven to be more economical in the manufacture of small quantity items in many cases and was a valuable supplement to drawing in the manufacture of metal parts.

J. W. Lengbridge

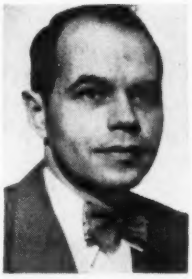
SPRAYED COATINGS. Sprayed-on fused coatings that outwear hardened steel from 5 to 25 times were described by L. V. LaRou, Chief Engineer, Wall Colmonoy Corporation, Detroit. LaRou told of wearproof alloys sprayed and fused on metal parts, such as tools, dies, gages and machine tool wear parts which resulted in tremendous reduction in maintenance costs. Ease of renewing the coating eliminates the cost of new tools or parts, he added.

L. V. LaRou

"The latest techniques for applying these nonporous hard surfaces permit the application of alloys to steels, stainless steels, copper and some cast irons," LaRou stated. The hard surfaces fused on tools or parts will not peel or crack off even under the severe wear conditions imposed in machining operations, he added.

FLAME-PLATING. Citing uses of "flame-plating" in varied fields such as lumber mills, cotton picking and precision gages, W. L. Donnelly, Research and Development Engineer, Speedway Laboratories, Linde Air Products Company, Indianapolis, Indiana, predicted widespread use of the new process in all types of industry. He said that flame-plating is, in a nut-shell, the only method of depositing certain powdered metals in the form of thin coating on metal parts without dilution by base metal or welding rod.

He said the life of circular saw blades now in use in several lumber mills had been increased approximately 20 times over that of a steel saw by use of the process. Field tests, he added, are now being conducted on cotton picking machines which have flame-plated spindles. Hundreds of precision gages have been flame-coated and tests have proven the wear life of the gages has been increased two to three times.



W. L. Donnelly

TITANIUM CARBIDE ALLOYS. Developed primarily for components of jet engines, rockets and gas turbines, the titanium carbide alloys are finding widespread use in tooling as metal cutting or forming tools, according to W. L. Kennicott, Chief Engineer of Kennametal, Inc., Latrobe, Pennsylvania. Kennicott said that new knowledge of the properties of the titanium carbide alloys will prompt increasing use of them by tool engineers.

In addition to being used now for

Milling Machine Attachments that STEP UP PRODUCTION

You can easily convert your general duty Milling Machine to a special purpose Miller by utilizing Kempsmith Standard Attachments. They can handle a great variety of milling operations with speed and precision, enabling you to step up plant production. Attachments 1 to 3, shown below, can be mounted on Kempsmith Millers. Numbers 4 to 7, inclusive, can be mounted on ANY make of milling machine. The same high degree of rigidity and precision characteristic of Kempsmith Milling Machines for more than 60 years is embodied in these sturdy attachments. Write for bulletins.

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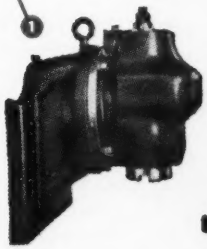
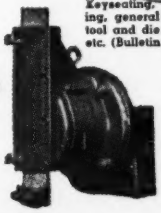
Converts horizontal to vertical machine, retaining identical spindle characteristics. (Bulletin No. 105)



Slotter
Keyseating, broaching, general slotting, tool and die making, etc. (Bulletin No. 107)

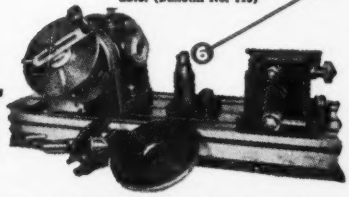


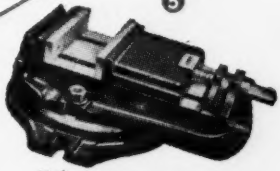
Hi-Speed Universal
High speed angular milling in all planes. (Bulletin No. 113)

Arbors and Accessories
A full range for standardized spindles carried in stock. (Bulletin No. 116)

Circular Table
Milling circles or cams, gear cutting, high-speed continuous milling, etc. (Bulletin No. 108)

Dividing Head
Precision indexing. Spiral cutting mechanism and chuck also available. (Bulletin No. 118)





Vises
Standard and Heavy-Duty, plain and swivel types. Adaptable to special jaws to save fixtures. (Bulletin 117)

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metal cutting or forming tools, the alloys are finding acceptance as parts of jigs and fixtures, gages and testing instruments, he added. The titanium carbide alloys have been developed in the last five years for their heat resistant properties of high strength, thermal shock and oxidation resistance, he said. These properties made them ideal for rocket and jet engine parts.

W. L. Kennicott

BALANCE. Modern machine tooling's high speed machines are dependent on perfect balance according to George C. Lawrie, Chief Engineer, Tinius Olsen Testing Machine Company, Willow Grove, Pennsylvania. Lawrie said the need for balancing increases as the speed increases since the shaking forces due to unbalance increase proportionately.

He said inaccuracy in machining was a major cause of unbalanced parts. Drilling to remove weight is the quickest and most accurate method of making balance corrections, Lawrie added. He described types of balancing machines now used in industry. Lawrie said some general machines could be used to balance various parts but that use of highly special equipment designed for one particular part was necessary in many production balancing operations.

G. C. Lawrie

ELECTROLYTIC GRINDING. The Russians have been claiming the invention of everything from the steam engine to radar recently, but they didn't invent the electrolytic grinding process according to E. H. Metzger, president of Super-Cut, Inc., Chicago. The Russians have done considerable development work in the field of arc and spark grinding, Metzger admitted, but they are often given credit for the electrolytic grinding process, which actually was invented by George Keeleric of Illinois, he said.

In the electrolytic process, material is removed from extremely hard metal parts and tools by the action of an electric current that flows through a liquid electrolyte between the metal workpiece and a moving metal-bonded diamond wheel, Metzger said. The diamond particles mainly act as insulating spacers that prevent metal to metal contact between the work and the wheel bonding material, and remove soft oxides produced by the electrolyte.

The electrolytic process can produce cutting tools requiring high finishes faster and cheaper than conventional grinding processes, and eliminates cracks and checks in carbide tools that often occur with the conventional methods, Metzger explained. Other cost saving advantages of the process listed in his talk were: reduced consumption of critically short diamond wheels, less operator skill requirements, and possible elimination of silicon carbide grinding wheel operations.

Metzger predicted a great future for the process as a result of the development of two new electrolytes which do not corrode the machines and a new

NOW BOYE' & EMMES *Stamina* IN SPECIAL PURPOSE LATHES

Turning requirements strictly special? Boye' & Emmes Long Life, Heavy Duty Engine Lathe stamina can still be yours. For Boye' & Emmes Special Purpose Lathes are built to the same basic specifications which identify "Long Life" with Boye' & Emmes Engine Lathes.

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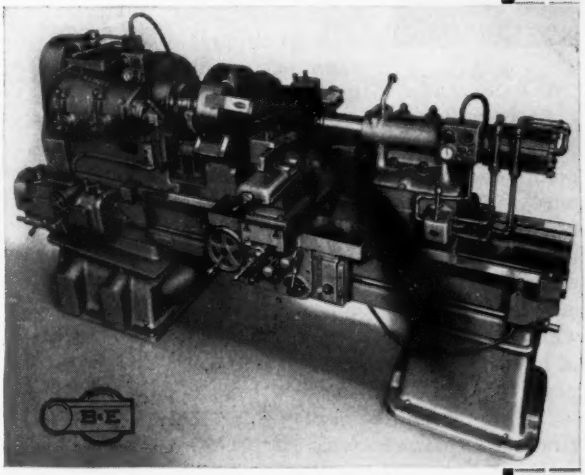
(1) Gears are in constant mesh, speed changes made through sliding jaw clutches. No gear wear due to shifting.

(2) Herringbone "back gear" in *front* of spindle exerts a powerful downward thrust to offset lifting action of cutting tool.

WORK:
Double tapering of graphite nipples.

METHOD:
Stationary 18" air-operated chuck grips and centers work. Air-operated tailstock rams live spur center into end of workpiece, forcing it into headstock spur driver which extends through 6" center hole in chuck. Chuck then releases workpiece and cutting proceeds, front tool cutting taper from end to center while back tool cuts taper from center to end.



SPECIAL TOOLING: Air-operated chuck. Air-operated tailstock. Front and rear tool holders. Taper attachment. Safety stops.

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process for orienting the pattern of the diamond particles in the diamond wheel practically at will.

WAX LUBRICANTS. "Wax" is in the dictionary but the hundreds of words defining it don't tell the story, according to James B. Carse, Industrial Products Sales Manager, S. C. Johnson & Son, Inc., Racine, Wisconsin. He said this was because a multitude of materials have been given the name of wax, thus making accurate definition all but impossible.

J. B. Carse

In his talk on "Wax Lubricants in Metal Working", Carse admitted pinpoint definition was of no real importance as long as the common properties of wax and the broad differences between the multitude of materials was understood. Carse said, "The right wax is a lubricator, a reducer of friction, with exceptional properties in the fields of temperature, pressure and adhesiveness. It is not a panacea."

During the talk he displayed for the first time charts showing results of a series of tests made by the University of Michigan Engineering Research Institute to explore the basic functions and principles of metal working lubricants as related to the entire subject of waxes.

ADHESIVES. Metal furniture with the appearance of wood which will not be marred by a cigarette no matter how long the lighted end remains in contact was forecast by O. W. Loudenslager, Manager, Research and Development for Goodyear Aircraft Corp., Akron, Ohio.

Loudenslager said tests have proved such furniture practical by bonding a thin ply of the desired wood onto the metal with a special adhesive material. He predicted this product development as one more outgrowth of the aircraft industry's work in developing lightweight bonded structures.

Cost reductions from future research and development will see the metal-to-metal bonding process spreading throughout all industry including the manufacture of walls, floors, sink tops, doors and partitions, he said. Bonded material can be expected in future passenger cars, Loudenslager said, because of its rigidity, lightness and sound-deadening properties. The materials have already been used in some truck bodies where heat insulation properties as well as advantageous structural properties were required, he said.

O. W. Loudenslager

MATERIAL HANDLING. "Self-serve" adds up to savings on industrial machinery as well as in supermarkets or "automats", according to J. R. Paquin, Tool Engineering Consultant, Worcester, Massachusetts. Paquin described "self-serve" feed hoppers for automatic selection and delivering of parts to machine tools for furthur processing. The hoppers convert "slow, hand fed machines into highly productive, fully automatic machines," Paquin said. Soaring labor costs, he added have increased industry's desire

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for automatic machines.

Various designs of hoppers, including paddle wheel and rotary models, have been designed to meet the varied needs of today's modern machine and metal working shops, he stated. The machines help themselves automatically to blank parts for processing as finished parts are automatically ejected, he said. Expert engineering can provide self-serve mechanisms no matter how complicated the parts may be, Paquin said. As an example he told of hoppers which feed small coil springs automatically.

J. R. Paquin

METAL STITCHING. Citing case after case to prove his point that metal stitching has resulted in enormous savings for industry, Arthur G. Denne, Manager, Round Stitching Wire Dept., Acme Steel Products Div., Acme Steel Company, Chicago, stated that the use of metal stitching machines has expanded within the automobile industry until they are now used on every possible operation.

A. G. Denne

Denne said the first metal stitching machine was developed in 1938 as a result in the change of construction of automobile bodies. In 1941, he added, stitching machines were first used experimentally in aircraft production. Tests have shown stitched parts from aircraft used in both arctic and tropical regions successfully resisted corrosion and vibration.

Included in his case histories was the story of how metal stitching made possible the re-design of one line of industrial floor sweepers. The sweepers originally had wood backs for the brushes which necessitated manual assembly and held production to enough brushes for 40 sweepers per day. By use of metal stitching, the sweepers were given a new design and production was upped to 550 per day. Longer brush life was a direct result.

Dr. George Sachs

NECKING. "Necking" is dangerous, according to Dr. George Sachs, Director of Metallurgical Research of Syracuse University, Syracuse, New York. However, Dr. Sachs was not referring to the same type of necking psychologists refer to in their admonitions. He had reference to the danger of necking and subsequent breaking of narrow metal sections formed to shape in manufacturing plants by bending.

Dr. Sachs said the behavior of the narrow sections during bending is a decisive factor in arriving at the forming limit of many contour-formed parts. The narrower the section, he added, the greater the danger of necking and subsequent breakage. The Syracuse research expert advised a systematic investigation of the variables involved in contour-forming or bending of metal parts to supply satisfactory design data for industry.

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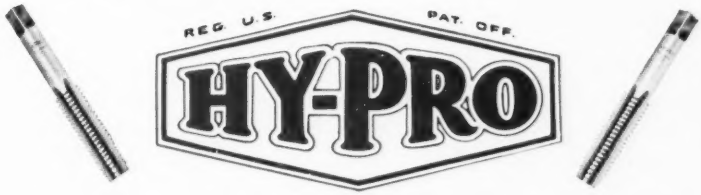

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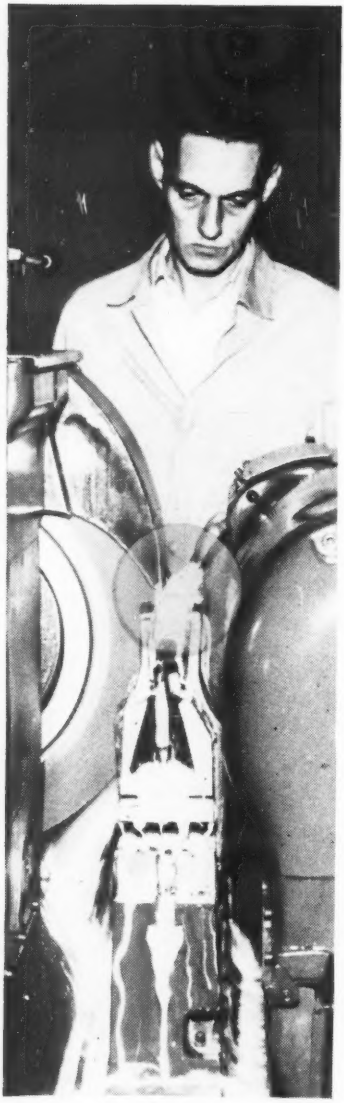


SOMETHING NEW IN HIS EXPERIENCE. It takes a lot of proof to convince grinding machine operators that one vitrified bond can be so much more efficient than another. Yet the new Norton G Bond has already made plenty of friends in plants throughout the country. How about getting your own shopmen's reactions to the "Touch of Gold"?

Add the "TOUCH OF GOLD" to your grinding with the NEW Norton G BOND

Here, ready to bring you immediate benefits, is the most radically improved vitrified bond ever produced — the new Norton G Bond!

Norton ALUNDUM* wheels made with the new G Bond cut freer, cooler and faster, hold corners better, are better for form grinding and produce a smoother finish. They do more work per wheel because they dress easier and produce more pieces per dressing.

Every one of these advantages means time and money saved — the real "Touch of Gold" that adds more value to your products and increases your profits by reducing your grinding costs.

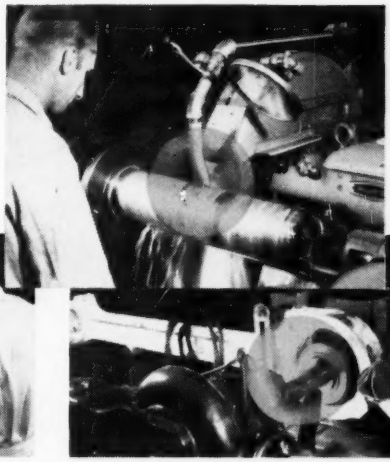
YOUR NORTON DISTRIBUTOR can supply you promptly with ALUNDUM wheels in the new G Bond. Ask him about arranging a try-out in your plant. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

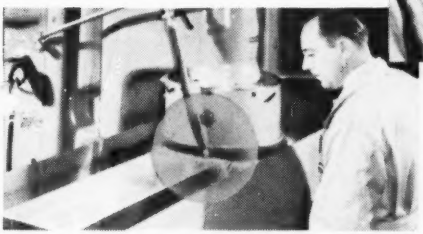
How the new G bond assures more efficient cutting action

ALUNDUM abrasive grains are held by the G Bond until they've done the most effective cutting job, then released to make way for new grains with fresh, sharp cutting edges. It's this unique ability of the new bond to hold the grains *just long enough* that keeps the wheel's grinding surface at constant peak efficiency.

Make these 3 easy tests...

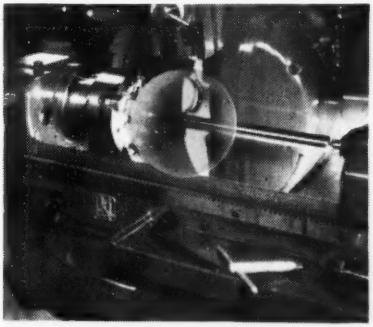
LOOK! You can see the difference in the spark stream of a Norton G Bond ALUNDUM wheel. No intermittent sparking, but a continuous, even stream that means uniform cutting action.





LISTEN! Norton G Bond wheels grind with the pleasant, steady swish-h-h of free, easy cutting. You hear no harsh grinding noise.

EXAMINE! On precision jobs, especially, you'll get the results you want faster. And every job you do with G Bond wheels will benefit by their new, unique cutting action.



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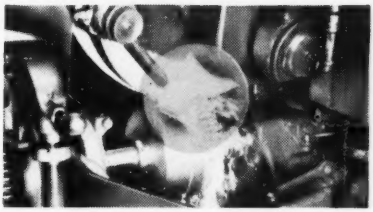

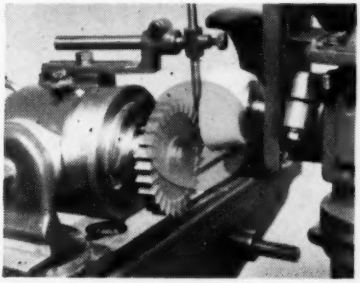

G BOND WHEELS HANDLE MANY JOBS, big and little, easy or difficult. You'll find them particularly valuable for such types of grinding as cylindrical, centerless, surface, internal, gear, tool and cutter, form and thread grinding and saw gumming.

W-1481

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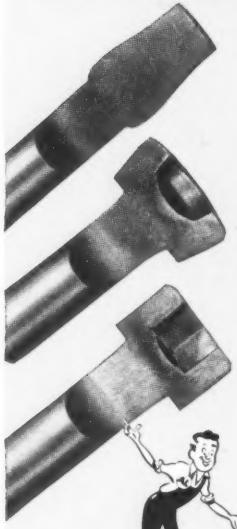
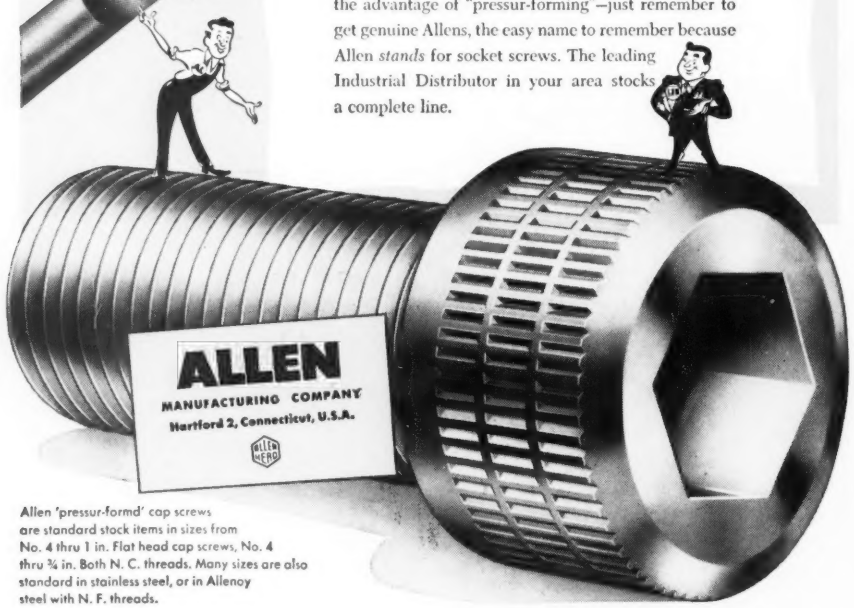
ASSURES A BETTER FIT, GREATER STRENGTH, LONGER LIFE



ALLEN'S specialized and perfected method of cold forging Allenoy steel produces the tremendous strength, fatigue resistance and precision that made Allen the *Number One* name in socket screws. Full "pressur-forming" preserves the tough Allenoy fibers continuous, uncut and concentrated where strength is needed most . . . conforming to the contours of screw head, socket and threads.

ALLEN PRESSUR-FORMING pays off in precision screws that you can count on to speed assembly, stand up better under continued hard usage. To be sure you get the advantage of "pressur-forming"—just remember to get genuine Allens, the easy name to remember because Allen *stands* for socket screws. The leading Industrial Distributor in your area stocks a complete line.



Allen 'pressur-formd' cap screws are standard stock items in sizes from No. 4 thru 1 in. Flat head cap screws, No. 4 thru ¾ in. Both N. C. threads. Many sizes are also standard in stainless steel, or in Allenoy steel with N. F. threads.

Important Meeting Dates

May 18-20

Annual Spring Meeting of the Metal Treating Institute, Hotel Shamrock, Houston, Texas.

May 20-22

Society for Experimental Stress Analysis Spring Meeting, Hotel Schroeder, Milwaukee, Wisconsin.

May 27-29

Seventh Annual Convention of the American Society for Quality Control, Philadelphia Convention Hall, Philadelphia, Pennsylvania.

May 31-June 3

Annual Meeting of the American Gear Manufacturers' Association, The Homestead, Hot Springs, Virginia.

June 7-12

Society of Automotive Engineers, Inc., Summer Meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, New Jersey.

June 16-19

American Welding Society National Spring Technical Meeting with Welding and Allied Industry Exposition at Shamrock Hotel, Houston, Texas.

June 28-July 2

American Society of Mechanical Engineers Semi-Annual Meeting, Statler Hotel, Los Angeles, California.

June 29-July 3

American Society for Testing Materials Annual Meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, New Jersey.

July 30-August 1

National Tool & Die Manufacturers Association Summer Meeting, Milwaukee, Wisconsin.

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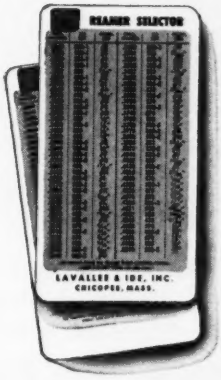

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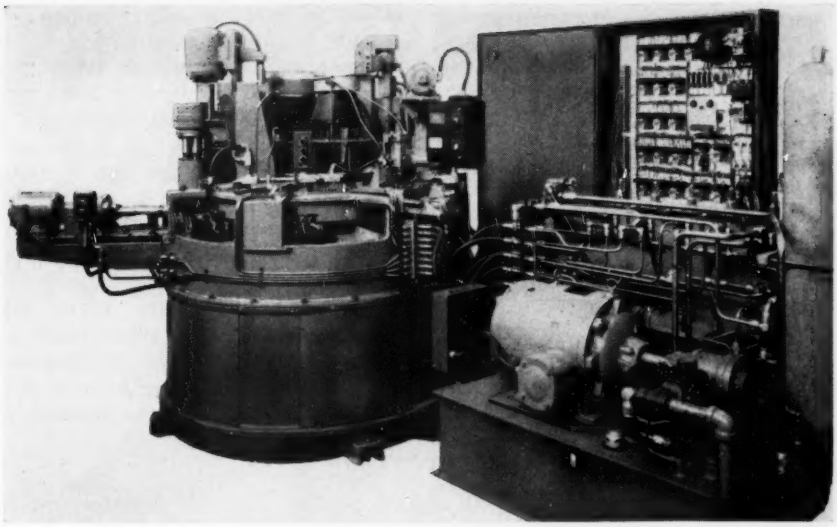
modern equipment at work

Job Shop Extends Service with Sub-Zero Equipment

WHILE many installations of Sub-Zero chilling equipment are used primarily in the treatment of standard or similar workpieces, the Model R-120 at the Queen City Steel Treating plant in Cincinnati, shown in the accompanying illustration, provides an excellent example of this type of equipment being effectively used for the low-temperature chilling of a wide variety of steel and aluminum workpieces. Primarily, the equipment enables Queen City to render a complete service to its customers for stabilization of steels, prevention of the aging of aluminum alloys, and shrink fitting operations.

The job shop installation of the Sub-Zero Model R-120 Chilling Unit shown here provides for the processing of a wide variety of steel and aluminum parts.

An example of a job requiring low-temperature in chilling involves special type ball bearings which range in size from ½ to 1 inch and are made from 440 stainless steel. By subjecting the bearings to the low temperature provided in the Sub-



With this semi-automatic hopper-fed 8-station machine, 280 oil pumps are assembled in one hour at 80 per cent operating efficiency.

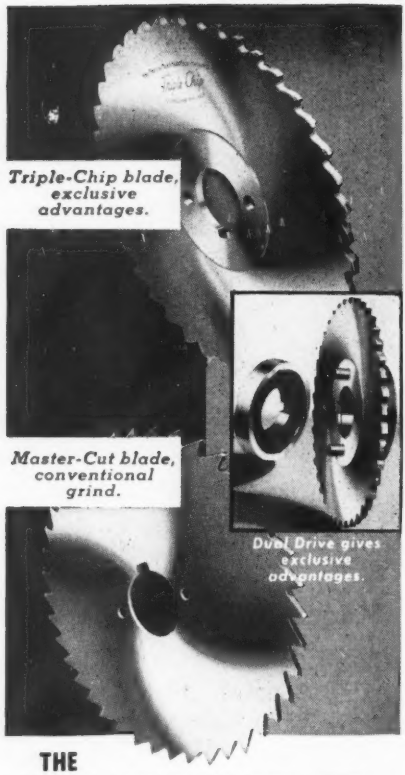
Zero unit, the retained austenite is reduced to a minimum. On tools and dies, when the steel reveals a "Rockwell soft and file hard condition indicating austenite," instead of rehardening, drawing or tempering, such parts are Sub-Zeroed. A sufficient amount of retained austenite is converted to martensite to obtain a stabilized condition with toughness and Rockwell hardness significantly increased.

Providing a temperature of minus 120 deg. F., the Model R-120 finds extensive use at Queen City for storage of annealed aluminum parts, the purpose being to retain their soft condition prior to delivery and subsequent forming operations in the customer's plant. The installation of this equipment has enabled this job shop to engage in subcontract operations involving the shrink fit assembly of cams on shafts, collars and shafts, and so on.

Machine Permits the Assembly of 280 Oil Pumps Per Hour

FOR the purpose of assembling oil pumps, Douglas Tool Co., 2300 E. Nine Mile Rd., Hazel Park, Mich., has produced the semi-automatic hopper-fed 8-station machine shown herewith. A combination hydraulic and mechanical system actuates this machine, which assembles 280 oil pumps in one hour at 80 per cent operating efficiency.

There are three simple manual operations, each requiring one man. Pump bodies are loaded and finished assemblies are unloaded by one operator. At station 1, the pump body is automatically clamped into place. Station 2 is an idle station. A hopper feeds in the idler gear shaft and presses this shaft into position at station 3. The



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Triple-Chip METHOD

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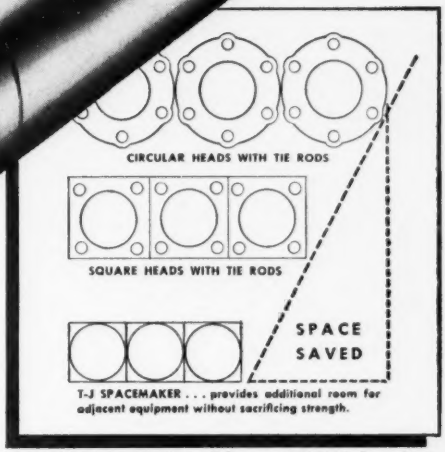
Only M & M builds ALL 3: CIRCULAR SAW BLADES, BLADE GRINDER

shaft is automatically checked for proper alignment at station 4 and is either accepted or rejected. Dowel pins are hopper fed into position and pressed in at station 5. An operator at station 6 inserts the idler gear, drive shaft and gear assembly, and puts a gasket into place. At station 7, an operator puts the cover on the oil pump and starts four cover screws. The cover screws and the pressure relief valve nut are automatically driven and torqued at station 8. When these operations are completed, the machine unclamps the oil pump so that it is ready for removal by the operator at station 1.

Stamping Company Utilizes Air Power in Producing Gearboxes

MEAD Specialties Co., 4114 N. Knox Ave., Chicago 41, Ill., reports that the Atlas Metal Stamping Company of Philadelphia has devised a simple but effective method to size three holes in a gearbox and three holes in a cover plate, using two Mead Model 122 air presses, as shown in Fig. 1. The operation is to place the cover plate or the gearbox in a registered position in a jig. Hardened ball bearings are then placed in the respective holes of the plate or box, and the "finger-tip" valves of the presses are tripped. When the ram of each press decends, pins in the upper half of the fixture force the balls through the holes, bringing the holes up to a true diameter. The balls drop into slots in the lower part of the fixture, ready for the next cycle. The valves are connected in series and require both hands to

NEW T-J Spacemaker AIR CYLINDERS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T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

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Streamlined construction of the new T-J Cylinders *eliminates tie rods . . . reduces head size . . .* and *saves up to 40% in mounting space!* In addition, a new high in strength is achieved with solid steel heads and heavy wall seamless steel body . . . leakproof construction . . . extra high safety factor.

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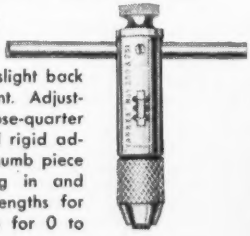
Shortcut costs on small jobs with this fast-acting, economical jig. Lock the work in the "Yankee" Angle Vise. Tilt for the angle and lock. You're set up for every operation . . . hand or machine. Also available with quick-release swivel base. Two jaw widths . . . 2" and 2¾". Each vise supplied with grooved "V" Block for holding rounds.

"Yankee" Ratchet Tap Wrenches for tight spots



Ratchet needs only slight back and forth movement. Adjustable cross-bar for close-quarter work. R.H., L.H. and rigid adjustments. Knurled thumb piece for speedy starting in and backing out. Two lengths for 0 to 5/16" taps, one for 0 to 3/16" taps.

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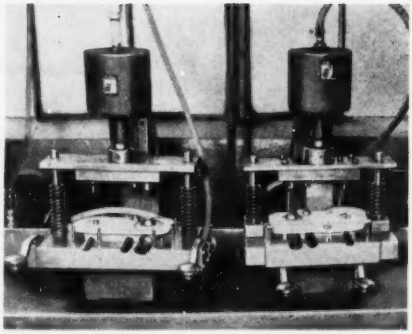
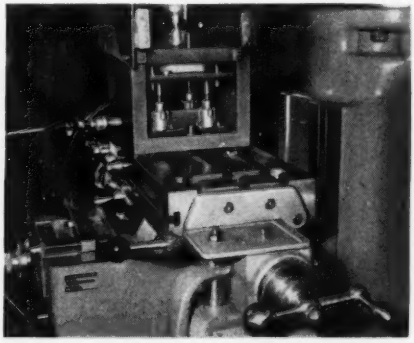


Fig. 1—At Atlas Metal Stamping Company, two Mead Model 122 air presses are used in sizing three holes in a gearbox and three holes in a cover plate.

operate so as to fully eliminate all possible danger to the fingers of the operator.

In another application at Atlas, Mead midget air cylinders are used in performing a milling operation on a die-cast gearbox. Figure 2 shows the gearbox being located in the milling fixture, the gearbox being held in proper position by four Mead V-1 midget air cylinders during a spot-facing operation.

Fig. 2—In another application at Atlas, Mead midget air cylinders are used in holding a die-cast gearbox in proper position during a spot-facing operation.



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Hydraulic Thread Milling Machine

The Most Revolutionary Improvement in Thread Milling Since the Invention of the Thread Milling Machine in 1901 by the Late B. M. W. Hanson, Founder of the Company.

new features

Hydraulic-driven cutter and work spindles insure balanced cutter speed and work feed — provide rapid traverse carriage. Variable cutter speeds up to 3,000 R. P. M. make possible instant adjustments during operating cycle. High speed permits efficient use of carbide cutters where applicable. The famous Hanson features of interchangeable lead cams, cross-feed cams, and completely semi-automatic operating cycles are retained in these machines.

Extensive field tests prove increased production, accuracy, and improved finishes. Production costs cut in half . . . cutter life three times greater.

Manufactured in the following capacities: 4" x 9", 10" x 24", 15" x 30", and 20" x 48". Longer beds to suit customers' requirements.

Engineered, Produced and Sold by the
HANSON-WHITNEY DIVISION of the WHITNEY CHAIN CO.
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Threading Processes
Offer Complete
Coordinated
Responsibility
for
The Machine Tools
The Cutting Tools
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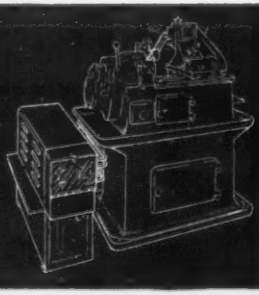
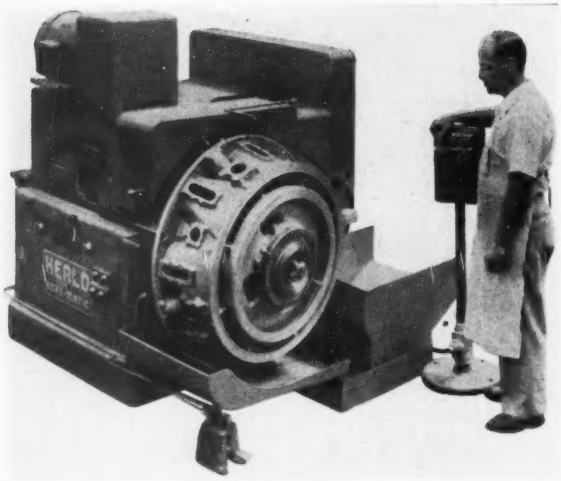


1HW53B



This Model 331 way-type machine borizes 40 surfaces on a jet part at a total cycle time of 12 minutes per part.

Special Way-Type Machine Borizes Jet Part

AN example of the versatility of the way-type precision boring machine built by The Heald Machine Co., Worcester 6, Mass., is the unit illustrated herewith, which is specially designed to borize a jet part. The machine is a No. 3 way-type unit with a vertical indexing 8-station fixture. The low mounting position of the fixture on the way unit facilitates the handling of the heavy awkward jet part. Work indexing is performed manually, with location controlled by an air-operated pin actuated by a foot plunger.

Tooling mounted on the boring head includes a cross-feed unit. In-stroke operations consist of turning and plunging a chamfer, following which the table strikes a positive stop and the cross feed operates with tools forming and blending two radii and generating a face. Forty individual borizing operations are performed on each part with a total cycle time, including loading and unloading, of 12 minutes per part.

The table is interlocked with the cross-feed unit so that it will not start the outstroke until all tools on the cross feed are clear of the work. In addition, the table is interlocked with the work-holding fixture so that the cycle cannot be started until the part is properly indexed. A pedestal push-button control panel allows the operator to control the machine at a point close to the loading station.

MILWAUKEE PRECISION EQUIPMENT

Surface Plates, Angles, Parallels, and Straight Edges are all backed by over forty years of practical experience. You pay no more for this added assurance of accuracy and durability.

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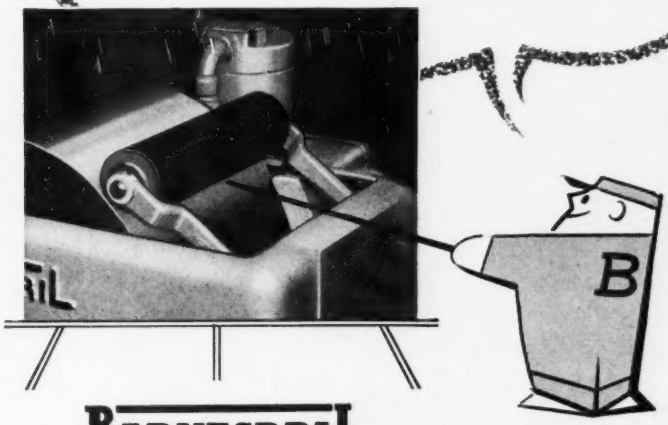
DRIES SWARF
FOR EASY HANDLING



BARNESDRIL

Magnetic Coolant Separator

As sludge is scraped off the drum for discharge into the sludge pan, a tension adjusted roller squeezes the swarf into a semi-dry state for easy handling. This BarnesdriL feature reclaims a substantial volume of coolant which might otherwise be lost.

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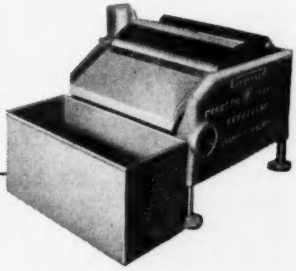


BARNES DRILL CO.

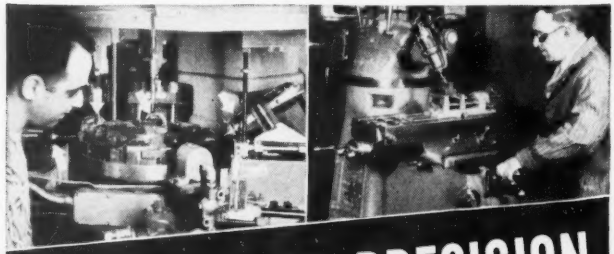
ROCKFORD • ILLINOIS

Single Dust Collector Provides Efficient Control of Dust in Tool and Die Shop

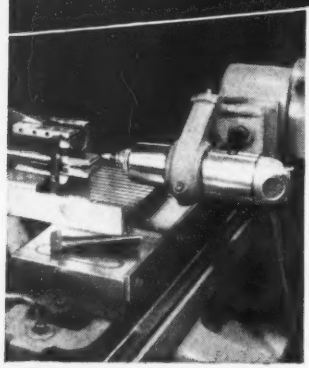
A TOOL and die shop wanted to control the dust resulting from the operation of five surface grinders and a cutter grinder. Five of the machines are located in one row along a wall, as shown in the accompanying illustration, while the sixth grinder is just across the aisle from the other five machines. A Model 2030 Dustkop dust collector made by Aget-Detroit Co., 207 Main St., Ann Arbor, Mich., was selected for this job since it has a rated volume of 2,405 c.f.m., sufficient to collect the dust generated by all six machines operating full time.

The dust collector was placed in the corner in line with the row of grinders. From the inlet of the collector, a header pipe was assembled up to and along the ceiling above the row of grinders and held in place by strap hangers. This header pipe was built up of straight sections of 7-inch galvanized pipe with "T" connectors above each machine except the last. From these "T" joints, and from the end of the header pipe over the last grinder in the row, were hung lengths of flexible metal hose terminated in wheel hoods at the level of the wheel of each grinder. The flexible metal hose enables the operator to change the position of the wheel hood for different grinding wheel positions.

Operation of the dust collec-



LOWEST COST PRECISION
FOR TOOL ROOM AND PRODUCTION



ONE PORTABLE MULTI-PURPOSE PRECISE GRINDER-MILLER WITH MACHINE TOOL MOUNT DOES THE WORK OF A SINGLE-PURPOSE MACHINE COSTING 100 TIMES AS MUCH!

Little can be done today to reduce labor and material costs. For substantial savings employ new, better techniques. Mount PRECISE Grinder-Millers on lathes, drill presses, milling machines and other machine tools or use in special production set-ups. ¾ HP; speeds from 20,000 to 45,000 r.p.m.; 115 volts, AC-DC. Ruggedly built for continuous duty. All metal housing; rigid PRECISE quill; sealed micro-precision bearings. *High speeds and accurate PRECISE quill and chuck are ideal for tungsten carbide cutters.* PRECISE will grind, mill or finish any material from soft wood to the hardest alloy steel.

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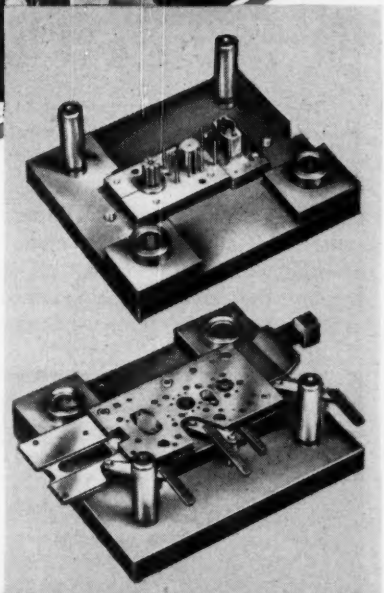
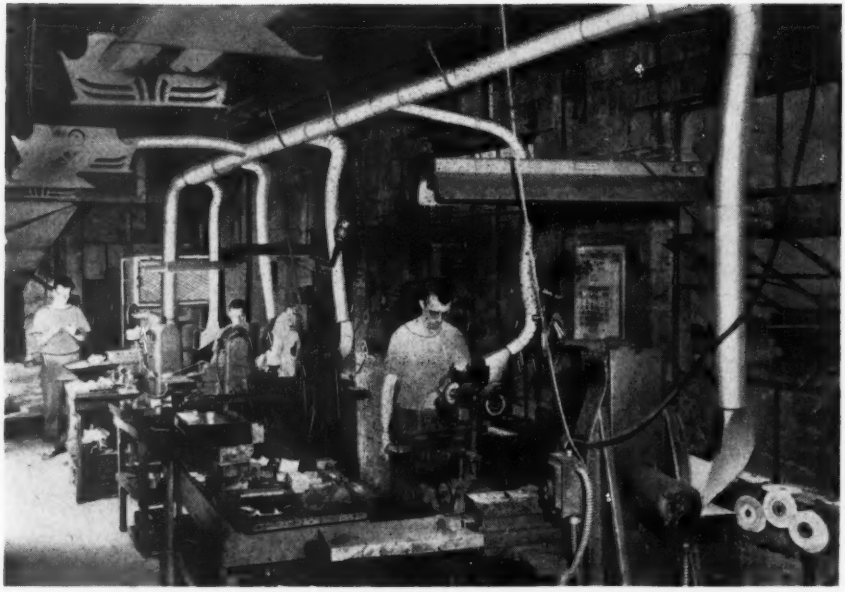


Combination Armature and Field Lamination Die Built by Harig

HARIG MANUFACTURING CORPORATION

5765 West Howard Street • Chicago 31, Illinois



A dust collector (left rear) of 2,405 c.f.m. rated volume provides efficient control of dust generated by several surface grinders operating full time in a tool and die shop.

tor is effected by means of a motor-driven self-clearing paddle wheel fan that discharges into a cyclone separator. The dust is deposited out of the bottom of the cyclone separator by centrifugal action into a 6 cubic foot storage bin. The cleaned air rises through the center of the cyclone separator and returns to the working area through a fire-safe Fiberglas filter. An occasional shaking down of the Fiberglas filter by means of a hand crank conveniently located on the dust collector lengthens the life of the filter so that replacements are needed only at prolonged intervals, and the dust storage bin is large enough so that periodic emptying are sufficient.

LUERS

PATENTED CUTTING OFF TOOL HOLDERS
PATENTED CUTTING OFF BLADES

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

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NEW! position material securely —in SECONDS!

AMF FLOAT-LOCK SAFETY VISES extend the usefulness of your drill presses and band saws. Reduce material spoilage, prevent tool damage...*save money*. Insure fast, safe, accurate work.

FOR YOUR DRILL PRESS, Float-Lock is a full-floating vise for *all* set-ups in tool rooms and production. Locks instantly anywhere on table . . . becomes a dependable drill jig. Turns over on three sides for maximum flexibility. Eliminates time-wasting clamps, straps, bolts.

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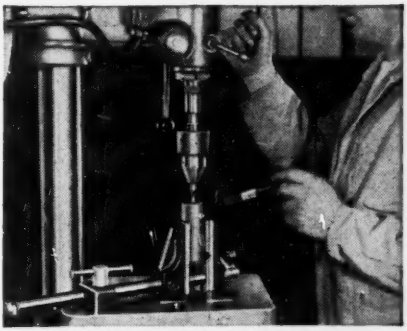
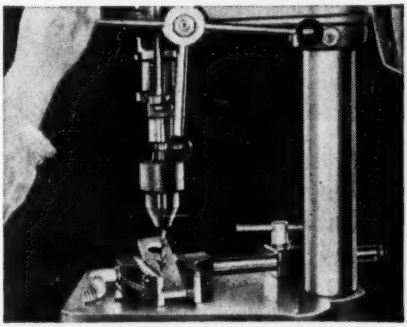
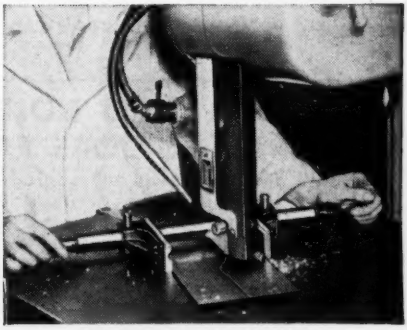
FOR DRILL PRESS ★ FOR BAND SAW



Ideal for centering and end drilling



Perfect for angle drilling



Cutting irregular shapes made easy

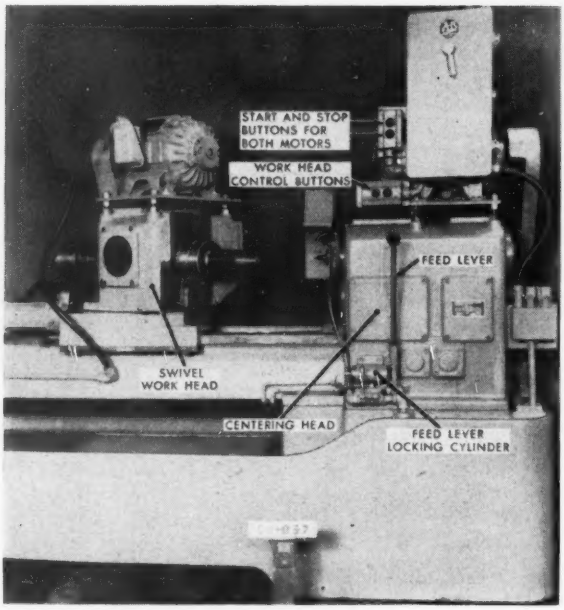


Fig. 1—This automatic centering machine is used by a manufacturer of 81 mm. Howitzer shells to center forged shells concentric with the bore and to hold center depth in relation to the bottom of the cavity.

Revolving Work Head Assures Uniform Wall Thickness in Projectile Turning

A MANUFACTURER of 81 mm. Howitzer shells has solved a centering problem with the automatic centering machine illustrated in Fig. 1, product of Seneca Falls Machine Co., Seneca Falls, N. Y. The problem was to center forged shells concentric with the bore and to hold center depth in relation to the bottom of the cavity.

Shells are held and centered on a 6-jaw air-operated expanding driver, as shown in Fig. 2. The three jaws near the open end are positively operated by the air cylinder, while the three jaws located near the bottom of the bore are operated by heavy spring tension to compensate for any variation in the diameter of the rough bore. The work head spindle revolves at slow speed while the center drill revolves at its own correct drilling speed. This combination provides a highly accurate method of centering hollow parts. To provide clearance for loading and unloading, the work head is swiveled

JIG BORE . . . DO HOLE SPACING JOBS FAST

Optical Spacer converts any vertical spindle miller into a jig borer. Accuracy .0002" guaranteed no matter what the error of the feed screws. Fastest hole spacing method known.

Use simple scribed template instead of jigs and dies. Inquire AIRMAIL.

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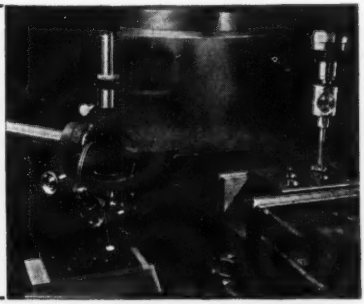

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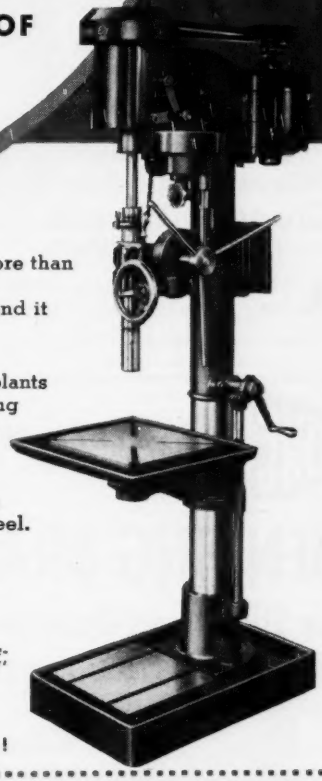
PROVE THE VALUE OF

Sibley's Model C-20 Drilling Machines!



Nothing demonstrates customer satisfaction more than repeat business—and judging from the repeat orders for the Model C-20, customers have found it to be a real investment.

This 20" swing machine has been tested in toolrooms and on production in hundreds of plants — and customers acclaim it as the finest drilling machine for its capacity they've ever operated.

There are good reasons for this acceptance! Operation is so effortless—power feeds selected by turning a knob; speeds range from 65 to 1360 R.P.M.; capacity of 1¼" in mild steel.

4 TO 5 WEEKS DELIVERY!
No lengthy waiting for your order.

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Model E-25 medium weight with 25" swing and ¾" capacity in mild steel. Heavier Models D-24 and D-28 in 24" or 28" swing with 1¾" capacity.

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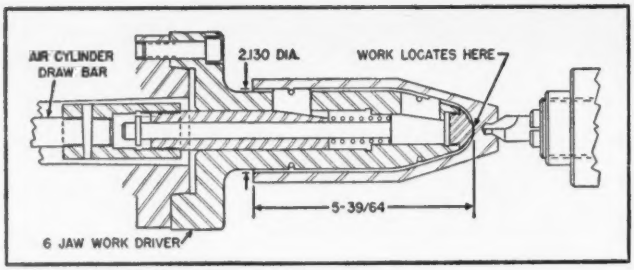


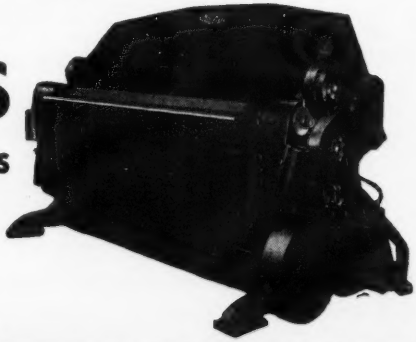
Fig. 2 — Shells are held and centered on a 6-jaw air-operated expanding driver.

to the position shown in Fig. 1. The operating cycle is automatic.

Camera Manufacturer Utilizes Single-Spindle Wet Grinder to Precision Grind Camera Parts

AT the David White Co., Milwaukee, Wis., manufacturer of the three-dimensional Stereo Realist camera (Fig. 1), precision is a necessity in the manufacture of such cameras; however, the previous method of obtaining this precision was found to be slow and costly. The die-cast aluminum camera parts were rough ground and then milled down 0.020 inch before a final grinding operation removed the last 0.002-0.003 inch of metal. The milling operation was slow and, due to the heat produced, caused distortion in the metal.

David White production men analyzed the problem and came up with

CHICAGO STEEL HAND and POWER
BENDING BRAKES
for Single and Quantity Runs
BENDING STEEL PLATE
and SHEET METAL
Special Bending Brakes
Double Folder Brakes

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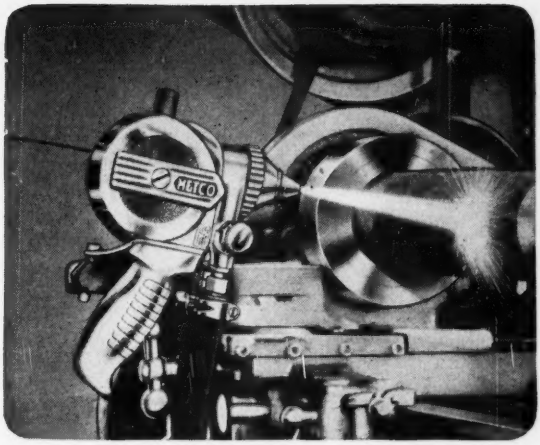
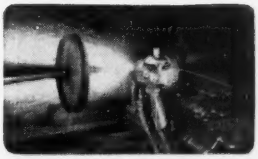


now a really low-cost metallizing installation...

with the *new* Metco L-Gun



Metallizing damaged journals on turbine shaft

Building up worn brake-drum

Metallizing protective coating on steel plate

New, low, compressed-air requirements . . . only 10 cfm at 40 to 60 psi, already available in many shops, or supplied by inexpensive 3 hp compressor . . . bring metallizing within reach of the small user.

Here's a chance for the smaller maintenance shop to get into profitable metallizing operations like these:

- Save up to 90% of replacement costs on machine repair jobs,
- Do your own hard-facing,
- Apply long-wearing corrosion-resistant coatings to exterior plant structures, tanks and other equipment.

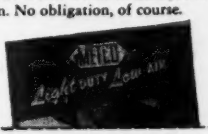
Sprays 23 Different Metallizing Wires—With the new L-Gun you can spray .10, .25, .80 carbon steels, stainless; babbitts, brass, bronze; nickel, aluminum, tin, zinc; special hard-facing materials such as Metco-Weld H, and the new self-bonding Sprabond wire.

It's Versatile—Use the L-Gun machine-mounted or hand-held—it weighs only 4 lb. 2 oz. Do all kinds of metallizing work—shaft and bore build-up with harder, longer wearing metals; build up worn pump plungers, crankshafts, motor shafts; apply corrosion-resistant coatings. There are hundreds of different jobs that are "naturals" for metallizing.®

Same High Quality as Other Metco Guns—The low air requirements of the new L-Gun have been achieved without any sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction—is built, like all Metco guns, for rugged, dependable service.

A Real Opportunity for the Smaller Shop—Thousands of large, well-known companies have been metallizing users for many years, not only in maintenance but in production applications on original equipment. Now, with the development of the new L-Gun, and a low cost installation, metallizing is within the reach of even the smallest plant. (We'll be glad to send you the names of some Metco users—large and small.)

Free Bulletin or Shop Demonstration—Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.



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☐ Please send me more information about metallizing.
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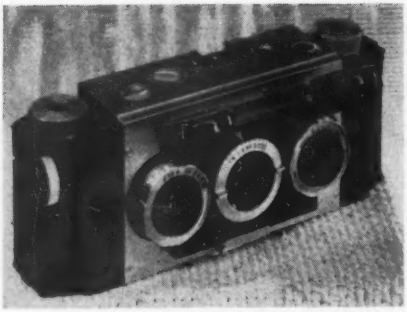


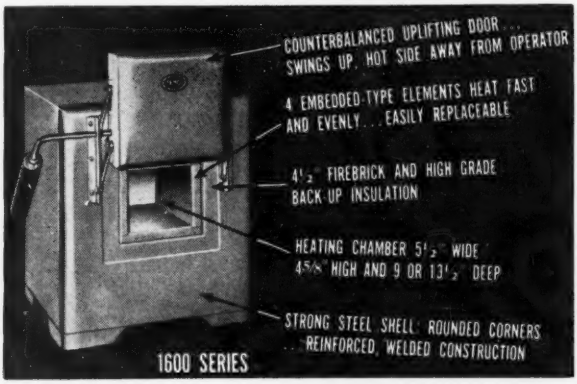
Fig. 1—Lens boards, bodies, and top covers for Stereo Realist cameras, such as illustrated herewith, are ground in one operation at the David White Company on an 18-inch single-spindle wet grinder, as shown in Fig. 2.

a solution in the form of an 18-inch Model 205 single-spindle wet grinder (Fig. 2), product of Besly-Welles Corp., 108 Dearborn Ave., Beloit, Wis., which removed all excess materials with such close accuracy that the milling operation was eliminated entirely. Under the new, shorter method, production, according to David White officials, has trebled, and a better finish is obtained on the camera parts. Since the work remains cool compared to the milling method, there is no distortion in the metal, and, in addition, abrasive costs have been reduced by the elimination of a felt sanding operation.

The David White Company is said to obtain the following accuracy with the Besly grinder; flatness within 0.001 inch; parallelism within 0.001 inch; size within 0.002 inch; and surface finish of 20-25 micro-inch. The No. C 80-L-12 resinoid - bonded open - struc-

solve heat-treat problems

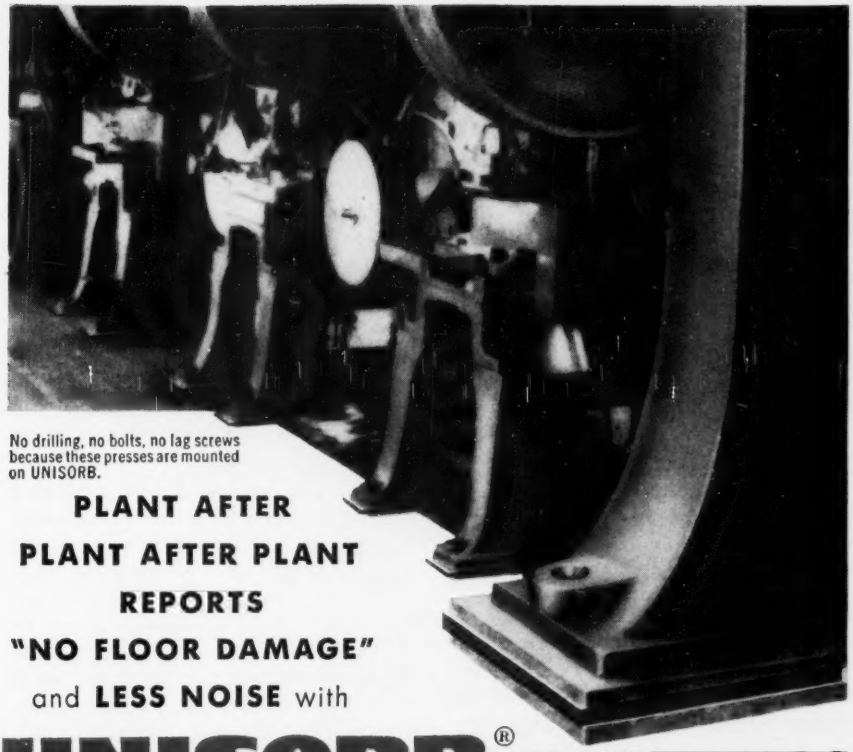
with versatile Temco bench-type furnace


COUNTERBALANCED UPLIFTING DOOR . . . SWINGS UP, HOT SIDE AWAY FROM OPERATOR
4 EMBEDDED-TYPE ELEMENTS HEAT FAST AND EVENLY . . . EASILY REPLACEABLE
4½" FIREBRICK AND HIGH GRADE BACK-UP INSULATION
HEATING CHAMBER 5½" WIDE 4⅝" HIGH AND 9 OR 13½" DEEP
STRONG STEEL SHELL: ROUNDED CORNERS . . . REINFORCED, WELDED CONSTRUCTION
1600 SERIES

Step up production, cut costs with Temco electric furnaces for heat treating dies, parts, tools, etc. Model illustrated above one of eight convenient sizes available with either electronic or manual temperature controls. Economical, easy to install and operate, low cost. Priced from $55.00 to $507.50. Write for literature and nearest dealer's name.

TEMCO® **ELECTRIC FURNACES**

THERMO ELECTRIC MANUFACTURING CO. • 488 HUFF ST., DUBUQUE, IOWA



No drilling, no bolts, no lag screws because these presses are mounted on UNISORB.

PLANT AFTER PLANT AFTER PLANT REPORTS "NO FLOOR DAMAGE" and **LESS NOISE** with

UNISORB® MOUNTINGS

No bolts, no lag screws . . . 60% to 85% less vibration to damage floors and machines when you use UNISORB mountings.

When you add the advantages of less costly installation, less maintenance time and better working conditions (less noise), you'll agree that it's time to get the whole story about UNISORB. Just return the coupon for your free copy of the UNISORB booklet.

It's easy to install machines on UNISORB! Just cement the pad to floor and machine base and the job is done. UNISORB is also available pre-coated with adhesive for use with machines that do not require shimming.

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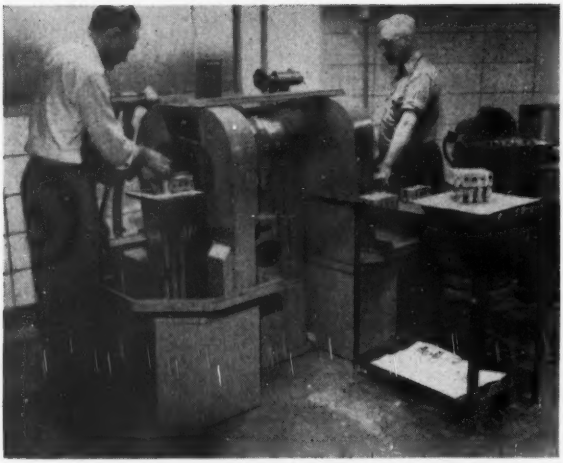


Fig. 2 — Grinding camera bodies at the David White Company. One hundred camera parts per hour are accurately ground on five surfaces with the grinder shown herewith.

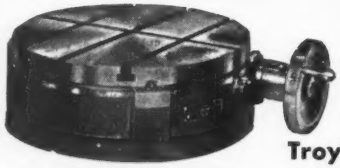
ture wheel used on the grinder is claimed to provide an average life of 4 months.

Special Gaging Equipment for Pins Records Deviation from Diameter in Millionths

AN unusual gaging problem was recently posed by a defense contract that called for the manufacture of cylindrical pins whose diameter must be checked at four points to plus or minus 0.000005 inch. For inspecting these production parts, Cleveland Instrument Co., 735 Carnegie Ave., Cleveland 15, Ohio, developed the special gaging equipment shown in the accompanying illustration.

The operation is as follows: The operator places a workpiece on a pair of cylindrical guide rails, using tweezers to prevent distortion due to body heat. He then depresses a lever at the front of the equipment, and a motor-driven pusher pushes the work to the right at constant speed along the guide rails between an anvil and gage head. The recorder chart shows the deviation from nominal diameter in millionths of an inch along the full lenght of the work. The chart paper drive is synchronized with the movement of the work past the gage head so that the operator can read the measurements at any desired points along the length of the piece.

PRODUCTION INCREASES...
***with* TROYKE ROTARY TABLES**



Sizes:
9 - 12 - 15 - 18 - 21 - 25.

See your dealer or write for Catalog No. 17, fully illustrated, showing all models and applications to various work.

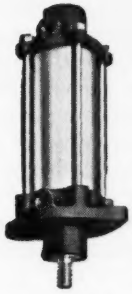
Dividing Attachments can be furnished for all models of Wormwheel operated Rotary Tables except the Model BH-9.

Troyke Mfg. Co., Cincinnati 9, Ohio, U. S. A.

Log-Edger Feed-Rolls lifted by NOPAK Cylinder

controlled by

NOPAK 3-Way Air Valve



NOPAK Model "D" Air Cylinder for Right Angle Flat Base Mounting, Rod End.

This Pacific Coast type log edger, manufactured by Albany Machine & Supply Co., Albany, Ore., employs an 8" NOPAK Model "D" Single Acting Air-Cylinder to lift the heavy feed-rolls by means of lever arms. This permits feeding of various sized cants as required. The cylinder is actuated by a 3/4" NOPAK, 3-Way Air Valve, equipped with lever extension-bar enabling the operator to manipulate it from any point in front of the machine. Weighted valve lever, when released, lowers rolls to "feed" position. Springs prevent feed rolls from dropping full length of cylinder stroke when machine is "empty."

This comparatively simple application may suggest how you can employ NOPAK Valves and Cylinders in your plant or product to actuate and control machine movements.

GALLAND-HENNING NOPAK DIVISION
2758 S. 31st STREET • MILWAUKEE 46, WISCONSIN

Refer to Sweet's File for Product Designers or write for Bulletin SW-1

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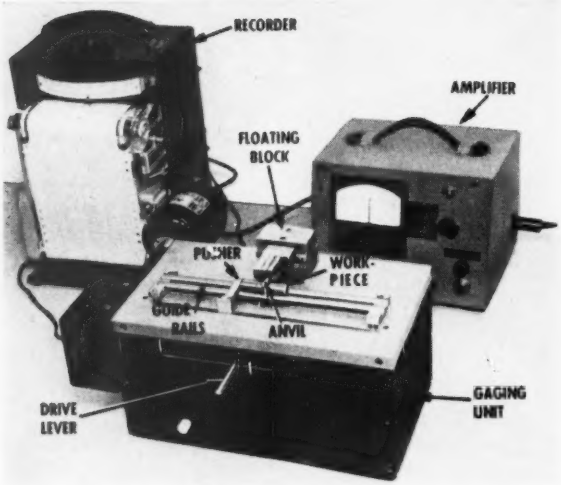
NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE



This special gaging equipment was designed for the production inspection of straight cylindrical pins whose diameter must be checked at four points to plus or minus 0.000005 inch.

The measuring element cosists of a Cleveland Micro-Ac gage head and amplifier. The gage head is located beneath the top plate and has a special cylindrical contact tip at right angles to the axis of the workpiece. The tip contacts the underside of the work, and a corresponding cylindrical fixed anvil, parallel to the cylindrical tip, contacts the top of the work as shown. The gage head and anvil are mounted on a single rigid block, which is attached to the frame by reed-type springs so as to swing freely without friction or backlash.

The floating-block mounting of the gage head and anvil, plus the construction of the anvil and contact tip, is said to prevent any erros that would otherwise result from the workpiece moving slightly out of position as it travels along the guide rails. These features, it is claimed, also assure that the unit measures only the actual diameter of the work, regardless of the straightness. A clamp knob at the front of the gaging unit provides for setting the length of travel of the pusher to suit the length of workpiece. When the work is pushed beyond the gage head, the pusher automatically returns to starting position at fast travel and stops.

With workpieces of 2-inch length, this equipment gages up to 120 pieces per hour. Dependability of measure-

Specify DESTACO FEELER STOCK
For precision fitting, checking clearances, inspection and production work. Available in 12" strips, ½" wide, in cellophane, packed 12 pieces of one thickness to a box; also in 25-foot coils. 14 standard thicknesses from .0015" to .015".
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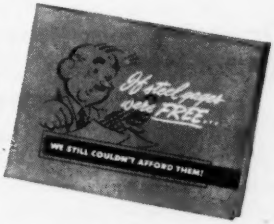
Savings reported by users of LINCOLN PARK CARBIDE GAGES

CARBIDE CUTS GAGE CHECKING
puts over $20,000.00 annually in our pocket.

A large midwestern motor manufacturer, who has about 100 gages in constant use, found it necessary to check his steel gages for accuracy every day. Changing from steel to carbide gages eliminated this daily checking requirement and he now checks his carbide gages once every 12 weeks. It costs $ .85 to check each gage and based on a 250 day, 50 week year his annual savings with carbide gages are $20,896.00 on checking costs alone.

For further information on how to reduce inspection costs with carbide gages, send for booklet—"If steel gages were FREE."



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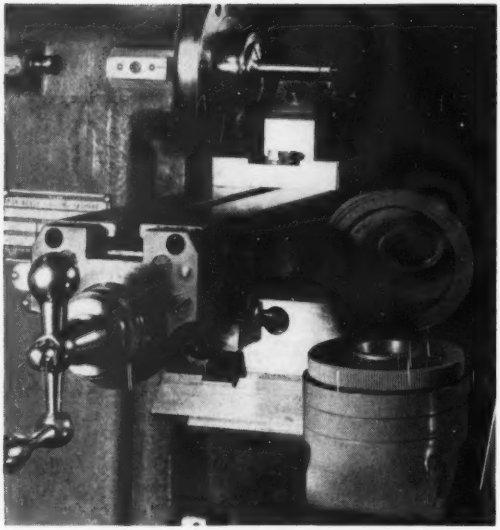

This illustration depicts the use which is made of an optical linear measuring instrument in the RCA Tube Department Plant, Harrison, N. J., for milling 20 to 100 slots per inch in electron tubes on a bench miller.

ment is said to be assured by the drift-free amplifier and by the frictionless movement of the gage head, which has no mechanical amplification.

Optical Linear Measuring Instrument Aids in Milling Electron Tubes

IN the RCA Tube Department Plant at Harrison, New Jersey, where electron tubes are made, it is necessary to mill from 20 to 100 slots per inch, 0.004 inch wide x 0.004 inch deep, on parts that regulate wire spacing for grids. Formerly, a first-class tool and diemaker was required to make the complete layout and perform the machining on a bench miller. He needed a vernier height gage and gage blocks to determine the correct spacing on each part. This procedure required a great deal of time. Production was costly, and the slot dimensions were not as uniform as desired.

After a Scan-A-Scale — an optical linear measuring instrument made by F. T. Griswold Mfg. Co., Devon, Pa. — was installed on the bench miller, the slot spacings and size became so uniformly accurate that the quality of the finished grids improved considerably. In addition, production of the parts doubled. It was no longer necessary to use a height gage and gage blocks, and a trades helper could make the layout and do the machining.

NEW DESIGN

LET'S FACE IT!

★ A Boring head that won't face is not complete

Boring, Facing, Turning, Grooving, Undercutting—

All in ONE Toolhead

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CHANDLER TOOL CO., Muncie, Ind.

COMBINED BORING & FACING TOOL HEADS

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The bronze bearings you need are as readily available as the Bunting catalog in your desk drawer. It gives all dimensions of hundreds of sizes of Bunting Standard Stock Bronze Bearings. Completely machined and finished, they meet every requirement in production and maintenance of industrial machinery. Your local Bunting distributor carries comprehensive stocks at all times.

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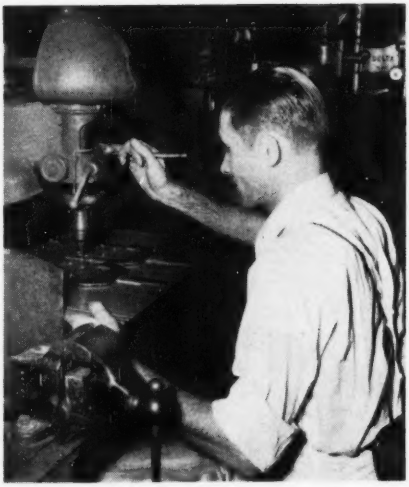
THE BUNTING BRASS & BRONZE COMPANY • TOLEDO 1, OHIO • BRANCHES IN PRINCIPAL CITIES

Individual Workbench Drills Reduce Costs and Assure Smooth Work Flow

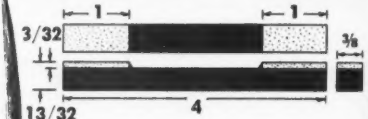
TO minimize the costly movement of men and machinery from one operation to another, the Binghampton Die & Machine Co., Binghampton, N. Y., manufacturer of dies for shoe companies, has installed a Delta 14-inch drill press on each operator's workbench. As a result, operating costs have been reduced and work flow has been made smoother. Of the 19 Delta drills in the shop, two with special attachments are used by all operators; the other 17 drills are assigned to individual workers. The total maintenance expense on all machines is claimed to be less than $20 per year.

The accompanying illustration shows an operator drilling a perforating die. All workbenches in the shop are equipped in the same manner.



Operator is shown drilling a perforating die by means of a Delta 14-inch drill press installed on a workbench.

DIAMOND HONES



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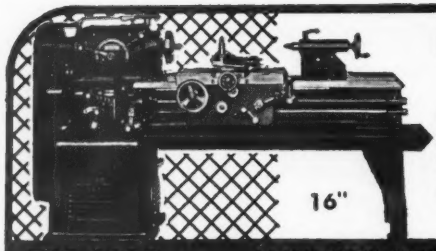

CARROLL AND JAMIESON LATHES

• This 16" lathe is equipped with 12 speed geared head, motor drive, and Timken mounted spindle. It's modern in design — with liberal dimensions.

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QUALITY PERFORMANCE AT LOW COST

WITH PRECISION MADE ROYAL TOOLS

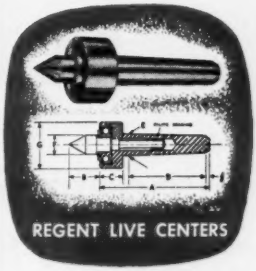
Good workmanship and fast, economical production depend on good tools. Royal Tools pay off from the very first moment you use them in your shop or plant production line. Compare performance and costs and you will specify 100% guaranteed Royal Tools.

Morse tapered 1 to 7; Jarno, B. & S., str. shanks, specials in various sizes.

Six interchangeable points • Tapered seat • Very short overhang • Pre-loaded heavy duty bearings • Hardened and ground tool steel points • Accuracy of ± .0001 • Available in toolmaker's case

Sizes 1 to 5 M. T.

Three interchangeable points • Replaceable parts and bearings • Hardened and ground points • Precision combination bearings • Positive bearing seal • Sturdy, medium duty tool • Handles large variety of lathe, grinding and milling jobs



Sizes 1, 2 and 3 M. T.

Small diameter head • Shorter overhang • Accurate to .0001 • Free-turning point revolves with smallest parts where point of average live center will not turn • Minimum deflection due to rigid, one-piece point • Oilite bearing and ball bearing

2½", 3½", and 4½" square

Twelve positions • Re-indexes to closest measurements • All working parts hardened • Simplifies and cuts set-up time • Achieves greater productivity and accuracy • Fully protected against dirt and chips • Fits all lathes

Spring Type: Finest, select steels • Properly heat treated and precision ground • Hard jaws • Styles 3C, 3AT, 5C, and 6AT.
Step Type: 3" in diameter • Machineable for multiple steps or desired diameters • Holds work firmly • Styles 3C, 3AT, and 5C.

Complete with Collet Sleeve

Precision-built and engineered handwheel type • Extremely accurate • Sturdy construction, finest quality workmanship and materials • Polished maple handle • Hollow torque tube extends through spindle • ½" capacity for all popular lathes

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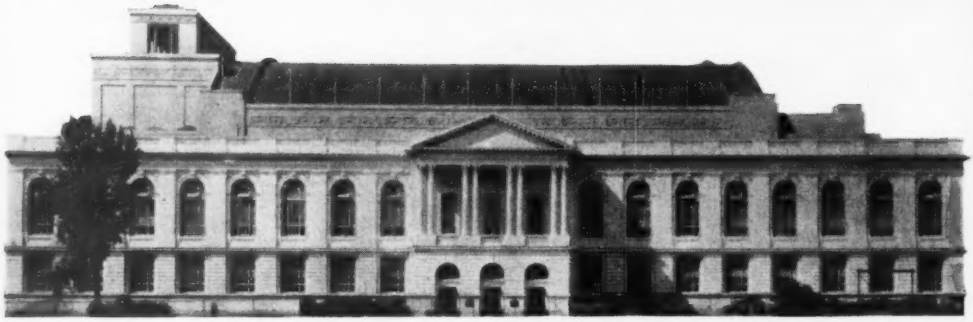

Philadelphia Convention Hall

Philadelphia's Convention Hall to House 7th Annual Convention of A.S.Q.C.

HIGHLIGHTING the greatly increasing interest in quality control applications in all industries, the 7th annual Convention of the American Society for Quality Control to be held in Philadelphia May 27 to 29, 1953, will present the broadest program of quality control applications and methods yet offered by the society in its annual event. The program embraces 37 technical sessions, two luncheons, and a banquet. Plant tours are planned at the Budd Company, the Ford Motor Company, and the General Testing Laboratories at the Quartermaster Depot. On the distaff side, the ladies will find their time taken up with guided historical tours, a fashion show, luncheons, and a social evening in the Benjamin Franklin Hotel Crystal Ballroom.

A larger number of exhibitors than ever before will display their products appropriate to quality control use or, in the case of a number of manufacturers, educational examples of quality control practices in their own factories. Program papers will discuss the impact of quality control not only in the metal-working and machining fields, but also in the chemical, petroleum, textile, plastics, and electronics industries. One series will deal with the armed services interest in quality control and their acceptance procedures; another series is planned to help those in the food industries, in the pharmaceutical field, and in packaging. Several prominent speakers will discuss how a quality control program helps management, engineering, and research, and, completing the circle, the favorable aspects of quality control from the viewpoint of organized labor and human relations.

Following registration, an opening assembly and luncheon, at which Frank Piasecki, chairman of the Piasecki Helicopter Corporation, will keynote the convention, the technical sessions will start Wednesday afternoon, May 27, and continue with morning and afternoon sessions through Friday, May 29. Chairman of the Host Committee is William J. Masser of the General Electric Company of Philadelphia. The convention also includes the annual meeting and banquet of the American Society for Quality Control.

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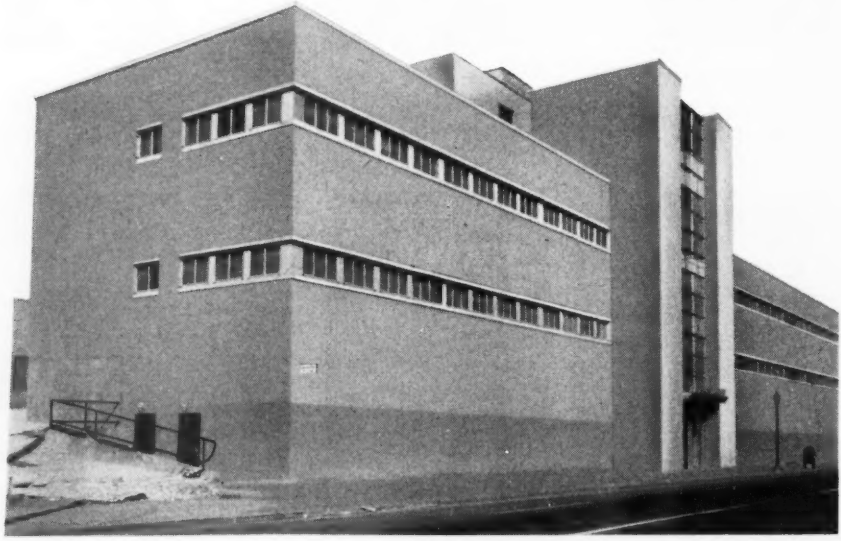
news of the industry

Lodge & Shipley Completes Administration Building

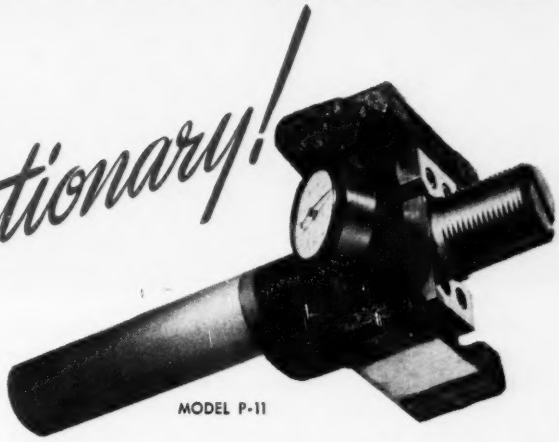
Built to release much needed manufacturing space, the new Lodge & Shipley Company administration building at 3055 Colerain Avenue, Cincinnati, Ohio, is a strikingly modern example of functional design. Three stories high with an additional section on the roof, the building is of reinforced concrete and two-tone masonry with limestone trim. It houses administrative personnel, engineering, tool design, time study, and other departments; new employee and executive dining rooms; and new sales demonstration facilities. Administration of both the adjoining manufacturing plant and



New administration building of The Lodge & Shipley Co., Cincinnati, Ohio

BRYANT INTERNAL THREAD GAGE

Revolutionary!



MODEL P-11

no other gage can tell so much— so fast—about internal threads

The P-11 Internal Thread Gage gives one accumulated reading of P. D., form and lead. Variation of these elements from basic size is shown on the dial indicator which reads in .0005". Interchangeable pairs of segments inspect all classes of internal threads from 5/16" to 5" dia. The segments work on the principle of an expanding master plug. This 14 oz. portable gage is designed for use in the shop or at the inspection bench. Descriptive literature on this gage and other Bryant gages is available on request. Send coupon today.

Bench type gages for external or internal threads are available, with or without squareness-of-face attachment.

BRYANT

CHUCKING GRINDER CO.

Springfield, Vermont, U. S. A.

MAIL THE COUPON TODAY!

BRYANT CHUCKING GRINDER CO., SPRINGFIELD, VT.

Please send me illustrated folders giving full information on the Bryant Portable and Bench Thread Gages.

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NAME_____ TITLE_____

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STREET_____

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Executives of The Lodge & Shipley Co.: (seated, left to right) Ralph W. Miller, secretary and controller; Carl F. Pabst, plant manager; William L. Dolle, president and treasurer; Frank A. Fritzsch, chief engineer; (standing, left to right) Thomas T. Kling, works manager; J. Hubert Cuni, director of industrial relations; J. Herbert Myers, vice president and sales manager.

widespread subcontracting operations are handled in the new building.

William L. Dolle, president, in commenting on the new building's purpose, said that besides centralizing office and administrative departments and providing new facilities for both employees and officials, the structure has already increased overall efficiency of the firm's operations. Construction details include two-tone grey brick exterior walls, dark at the base of the building and the entrance wing and lighter toned brick on the upper walls. The entrance wing is structural glass to the top of the building.

Fronting 251 feet on Colerain Avenue, the building joins with the manufacturing buildings on a 12-acre plot behind it and contains a total of 33,000 square feet of office floor space. Air conditioning, fluorescent lighting, acoustical ceilings, and asphalt tile flooring are used throughout. An automatic passenger elevator serves all floors. The ground floor includes a large employees' cafeteria, personnel offices, medical facilities, and the purchasing department. Engineering, production control, and methods department offices are on the first floor. Executive and sales offices are on the second floor and the executive dining room on the top floor section.

The firm manufactures a standard line of engine and other lathes, as well as the T-Lathe and T-Matic Lathe for jet engine and other production.

ON OILY AND GREASY FLOORS
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COSTLY SLIPPING ACCIDENTS
USE Tamms
FULLER'S EARTH
Adds greatly to the safety of your shop • Provides safe non-slip footing • Absorbs oil and grease • Lessens fire hazard because, unlike saw dust or wood shavings, it is non-inflammable • Every shop needs this low cost safety aid.
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Milling Cutters Gear Cutters Twist Drills Hobs Reamers Carbide Tools

OWNERS AND OPERATORS OF: **S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.**
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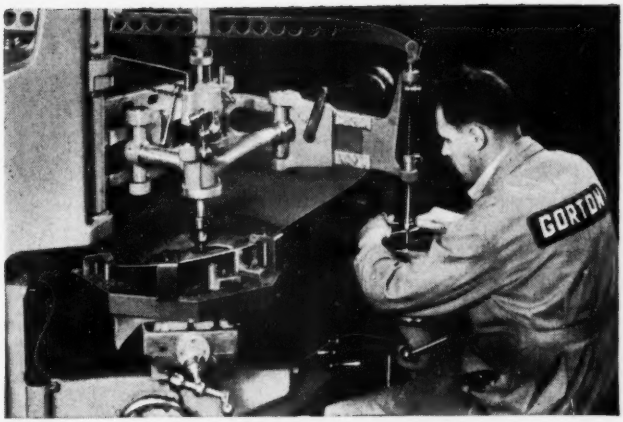


Tracer-Controlled Pantograph cuts and rounds thermal slot in 8-foot steel propeller blade in 40 minutes; previous time was 5 hours, 10 minutes — just one of hundreds of examples of time and cost saving with tracer-controlled Pantograph machines.

Pantography IS NEW —

— in the sense that industry at large and Metal Working people in particular are just beginning to appreciate the many advantages Pantography offers to those faced with the Design-Production problems of today and tomorrow.

By George Gorton III
Executive Vice President
George Gorton Machine Co

INDUSTRY'S foremost responsibility right now is to produce faster, to highest quality standards and at lower cost — whether on defense contracts or for our civilian needs.

Today, there are literally thousands of operations being performed throughout industry which can be speeded up, improved in quality and lowered in cost by the use of available models of special machine tools. The modern tracer-controlled Pantograph machine is such a tool. It is both a special purpose machine, ideal for short runs, and it is an accurate single purpose machine which turns out identical parts or pieces to meet tight production schedules.

The tracer-controlled Pantograph machine is used for inside and outside profiling, routing, die sinking, mold cutting, counterboring, contour milling, chamfering, grooving, graduating and engraving in ferrous and non-ferrous metals, as well as in plastics.

This machine performs on flat, uniformly curved, cylindrical, spherical or irregular shapes — it works in either 2 or 3 dimensions, in all directions on a horizontal plane, and vertically. It employs enlarged masters, templates or patterns which are quickly and easily made and operates normally at a reduction ratio thereby increasing accuracy — exclusively characteristic of the pantograph.

Single or repetitive accuracy — from one piece to thousands — manual or full automatic operation depending upon quantities — work sizes from the size of a dime to as large as 10 feet.

A new booklet, "Pantography," explains the process and shows what this type of machine can do for you. It is yours without obligation. Write for it today. If interested, also ask for our latest General Catalog 1655. Address the George Gorton Machine Co., 1705 Racine St., Racine, Wisconsin, U. S. A.

New toggle clamp assembly plant of Detroit Stamping Company, located in Birmingham, Mich.

"De-Sta-Co" Toggle Clamp Production Facilities Expanded by Branch Plant

Detroit Stamping Co., Detroit, Mich., has announced the opening of a new assembly plant devoted to the manufacture and packaging of its line of production work-holding tools, "De-Sta-Co" Toggle Clamps. The additional plant, located in Birmingham, Michigan, is equipped with the newest machinery available and will permit increased facilities needed to meet the demand. The main plant and offices of the company, manufacturer of specialized pressed metal parts as well as finished products, will remain at 350 Midland Ave., Detroit 3, Michigan.

for greater RIGIDITY
more ACCURATE cuts

Use
CRITERION
BORING
HEADS

CRITERION machine WORKS

A full line of adjustable boring heads and bars now available. Heads 1½" to 7" dia. Carbide or high speed bars ⅜" to 1¼" dia. Lead screws ground AFTER HARDENING. Ample bearing surface, heat treated parts, interchangeable shanks. Criterion tools are the criterion. Write for free catalog and costs.

9312 SANTA MONICA BLVD. • BEVERLY HILLS, CALIF.

grinding and fitting

DIFFICULT CONTOURS

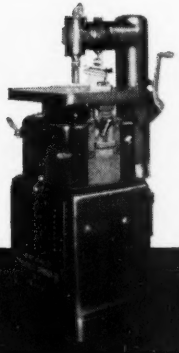
is EASY with a

BOYAR-SCHULTZ
No. 1 Profile Grinder

A Bench model with Spindle speed of 20,000 R.P.M., Boyar–Schultz No. 1 Profile Grinder is a rapid Stock remover.

An ideal machine tool for grinding and fitting irregular inside and outside contours and profiles such as die clearances and other many grinding jobs that would otherwise require time consuming set-ups. A real time-saver, performing in minutes many jobs that formerly required hours.

Accommodates wheels ⅛" to 1" diameters.



Boyar-Schultz
No. 2 Profile Grinder

For grinding and fitting large dies and punches such as forming dies for refrigerators, tables, sanitary ware and other large work. Spindles turn at 10,000 R.P.M. Accommodates wheels ¼" to 3" diameters.

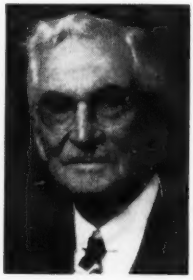
BOYAR-SCHULTZ CORPORATION

2120 Walnut Street • Chicago 12, Illinois

Richard Knight LeBlond

Richard Knight LeBlond, founder and chairman of the board of The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, died recently at the age of 88 after an illness of several months. The pioneer machine tool builder was an active participant in company affairs as chairman up to the time of his illness, when he had completed 66 years as head of the company.

After finishing lower school grades, Mr. LeBlond began his apprenticeship with the Franklin Type Foundry in Cincinnati. While working, he attended night school at the Ohio Mechanics Institute, studying mechanical drawing and general mechanics. Five years later, Mr. LeBlond went to St. Louis to work for a similar concern for two years, at which time he attended Washington University at night. Another brief period of apprenticeship in Providence, Rhode Island, furthered his knowledge of machine shop practice.



R. K. LeBlond

In 1887, when he was 23 years old, R. K. LeBlond started his business with three employees, specializing in the manufacture of printing type molds, gages, and small tools connected with the type-making in-

LEVIN®

MICRO-DRILL PRESS

for holes as small as .002"

Designed to hold small drills in precision collets. Absence of a sliding quill guarantees extreme sensitivity with finger-tip control. A mounted 1/8" capacity drill chuck can also be used.

Write for Bulletin H describing the Micro-Drill Press and listing collet sizes. Louis Levin & Son, Inc., 782 E. Pico Blvd., Los Angeles 21, California.

JONES & LAMSON GUARANTEES CLASS III THREADS with REPETITIVE ACCURACY!

J & L Automatic Opening Die Heads are sold with this guarantee: that your threads will be held consistently within the exacting Class III tolerances for form, lead and pitch diameter, throughout the long life of the J & L chasers.

RADIAL CHASER TYPE
Capacities from #8 to 4¼"

TANGENT CHASER TYPES
Stationary and Revolving. Capacities from #4 to 2"

Some of the reasons why:

COMPACT, RUGGED DESIGN GIVES MAXIMUM SUPPORT TO THE CHASERS. J & L Dies are made of solid steel, no built-up sections, hardened and precision ground throughout. Chasers are supported at the point of, and in the direction of, maximum strain.

THREAD FORM, HELIX, PRECISION POINT HEIGHT, ARE ALL GROUND INTO CHASERS AFTER HARDENING. This gives you a freer cutting tool, operating with minimum wear and repetitive Class III accuracy. The high precision of the J & L chasers is maintained in the Die by exclusive chaser holding features.

EASY, CONTROLLED RESHARPENING. J & L chasers are resharpened independently of the holders or dies. Instructions are simple, easy to follow. Eliminates guesswork. Exclusive holding features assure accurate resetting.

Only J & L Die Heads and Chasers give you ALL these features. Write to Dept. 710 for illustrated catalogs and complete information.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO.,
521 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

J&L DIE HEAD DIVISION

dustry. In 1891, arrangements were made to build lathes and lathe attachments for another Cincinnati concern.

Throughout his career, R. K. LeBlond devoted much of his time to strengthening the machine tool industry. He was a charter member of the National Machine Tool Builders' Association and worked closely with other machine tool builders.

Norton Distributes Full-Length Company History Book to Employees

Publication of "The Norton Story," the first full-length history of Norton Company ever written, was distributed to company employees recently. Authored by Mildred McClary Tymeson of Holden, the book was published by Norton's Public Relations Department and printed by Commonwealth Press, Worcester, Mass.

The first edition runs 8,000 copies. Including 112 photographs, the book totals 324 pages and an appendix containing the names of all Norton 25-year men and women in Worcester and its district offices now active, retired, and deceased. Advance copies of "The Norton Story" were sent to each retiree and 25-year employees. Work on the book has been going on for the past 2½ years in the course of which the author interviewed over 300 active and retired employees to form the foundation for her story, which is an

only RED-E Anti-Friction CENTERS are Superaccurate!

For Light, Medium and Extra Heavy Work on Tubing and Larger Center Holes.

• The world's finest centers are RED-E . . . each type the result of engineering know how, backed up by nearly 50 years of experience. The "Shank" and the "Ball & Roller" Type centers illustrated are just a few of over 200 exclusively designed centers available.

Ask for Catalog "B" (Pipe and Bull Nose Centers). "C" (Anti-Friction Centers). "D" (High Speed—Carbide Tipped Centers).

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TOMORROW'S SANDING FABRIC TODAY!

USE WET OR DRY

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USE BOTH SIDES

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By Machine or Hand

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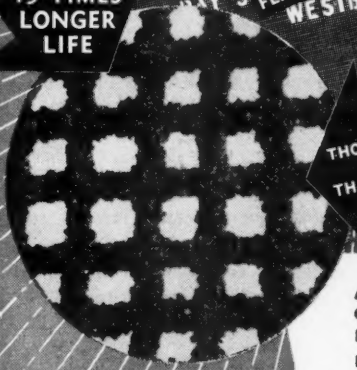
LONG LIFE

10 to 15 TIMES LONGER LIFE



THOUSANDS OF SUPER-SHARP EDGES THAT KEEP ON CUTTING

SEND FOR SAMPLE!

ANOTHER SPARKLING BAY STATE "FIRST"! Once and for all, **GRITCLOTH** solves the age-old problem of clogging sandpaper and other types of coated papers. GRITCLOTH'S revolutionary open-mesh design lets the removed particles flow right through, and the sharp abrasive teeth keep right on cutting. Actual tests show 10 to 15 times the life of ordinary coated papers.

For all finishing jobs on either wood or metal, **IT'S GRITCLOTH TODAY.**

IT'S NEW IT'S BETTER IT'S BAY STATE

BAY STATE

BAY STATE ABRASIVE PRODUCTS CO., WESTBORO, MASS., U. S. A.
Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh
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In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ont.

intensely human one where emphasis is placed on people rather than on technical descriptions, financial statements, graphs, and charts.

Lincoln Electric Presents Service Pins at Annual Banquet

At the company's annual banquet, A. F. Davis, vice president and secretary of The Lincoln Electric Co., Cleveland 17, Ohio, presented to James F. Lincoln a service pin in recognition of his 45 years with the company, 39 of which have been as executive head of the company. Approximately 1,000 company workers, their wives, and friends, gathered for the annual banquet and dance, which was the occasion for the presentation of service pins. Pins in recognition for service of 10 years or more were presented to 188 Lincoln workers, the largest group of service pins ever given by the company.

A. F. Davis, vice president and secretary of The Lincoln Electric Company, is shown presenting a 45-year service pin to J. F. Lincoln, president, on the occasion of the company's annual banquet.

The ARBOR PRESS
You've Been Looking For!
It's the new Manzel 10 Ton Hydraulic Arbor Press...engineered to meet a variety of needs in manufacturing plants and automotive service stations. The long ram stroke and unusual depth and width of throat make it adaptable to straightening, material testing, bending, bearing or bushing work, and many other uses. Gauge is optional.
The press is portable...or can be permanently mounted on bench, column, or wall. Power unit operates 3 times faster. Ram is self-retracting. Write today for complete information.
Manzel
315 Babcock Street
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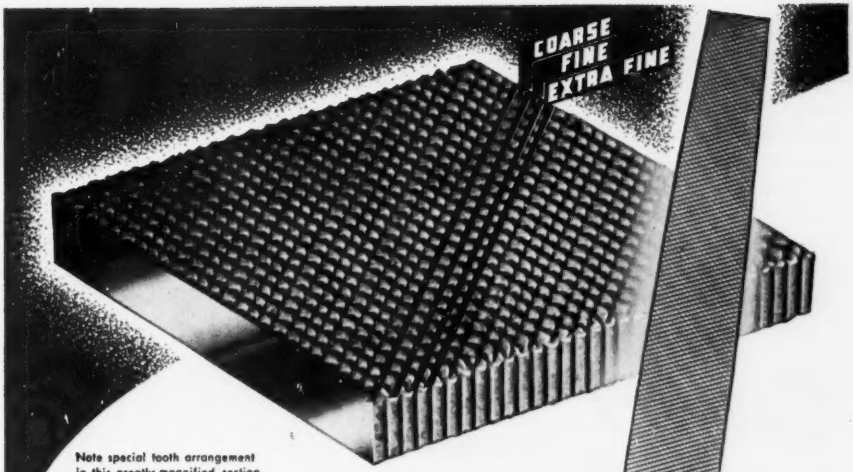
Jobber inquiries welcome



Note special tooth arrangement in this greatly magnified section.

here's why Heller NUCUT wavy teeth* save half your work

★ Scientific tooth spacing provides double-action filing—cuts fast and deep, finishes smooth and scratch-free. This same feature eliminates chattering and makes possible a more durable, longer lasting file. Order from your local distributor.

HELLER BROS. SINCE 1856

HELLER BROTHERS COMPANY

America's Oldest File Manufacturer

NEWCOMERSTOWN, OHIO

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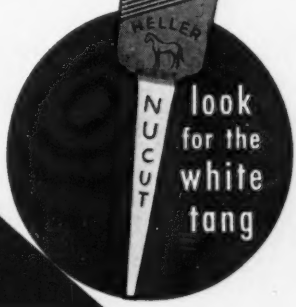
VIXEN NUCUT

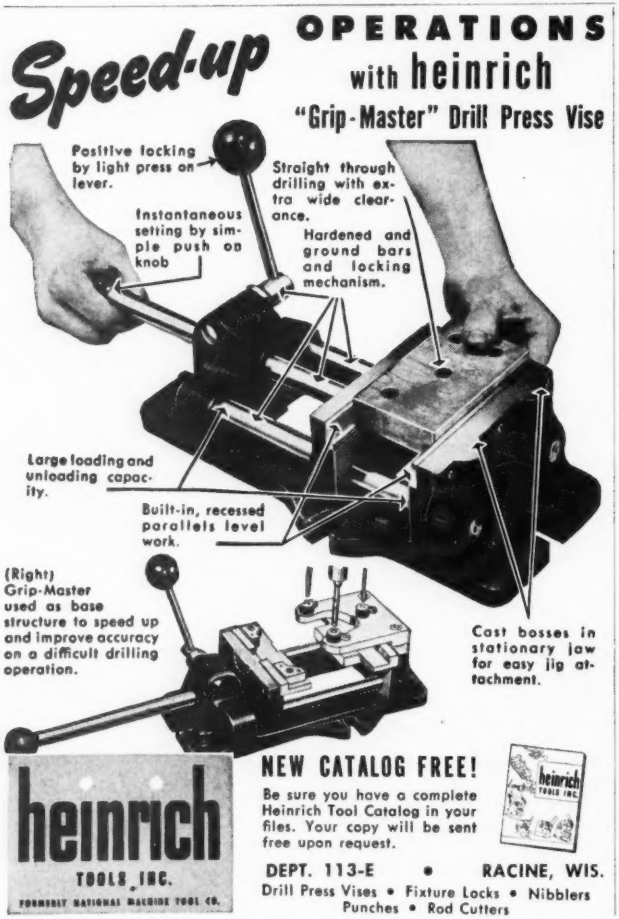
*made only by Heller Brothers



Steel Founders' Society Annual National Awards Made at Chicago Meeting

National medal awards for outstanding leadership in the steel castings industry were made by the Steel Founders' Society of America at its annual meeting held recently at the Edgewater Beach Hotel, Chicago, with more than 300 top management, sales, scientific, technical, and operating executives in attendance from all parts of the country. Honored with presentation of the society's top national award, the Lorenz Gold Medal, was Henning A. Forsberg, vice president, Continental Foundry & Machine Co., East Chicago, Ind., who served as president of the society during 1952. Award of the society's national Technical and Operating Gold Medal for 1952 was made to G. A. Lillieqvist, research director and chief metallurgist, American Steel Foundries, also of East Chicago, Indiana.

John A. Rassenfoss, assistant research director, American Steel Foundries, East Chicago, received the annual Steel Foundry Facts Award for excellence of material published in the society's technical publications. Second prize in the same category was shared by C. B. Jenni, chief metallurgist, General Steel Castings Corp., Eddystone, Pa., and K. S. Howard, who retired as a vice president of General Steel Castings Corporation in 1952, and now is serving as as-


Speed-up
OPERATIONS
with heinrich
"Grip-Master" Drill Press Vise
Positive locking by light press on lever.
Instantaneous setting by simple push on knob
Straight through drilling with extra wide clearance.
Hardened and ground bars and locking mechanism.
Large loading and unloading capacity.
Built-in, recessed parallels level work.
(Right) Grip-Master used as base structure to speed up and improve accuracy on a difficult drilling operation.
Cast bosses in stationary jaw for easy jig attachment.
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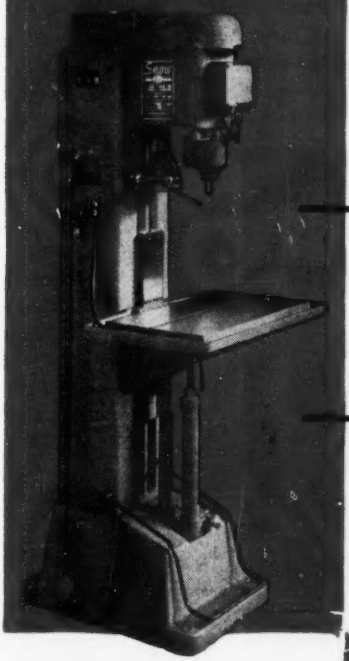
FORMERLY NATIONAL MACHINE TOOL CO.
NEW CATALOG FREE!
Be sure you have a complete Heinrich Tool Catalog in your files. Your copy will be sent free upon request.
DEPT. 113-E • RACINE, WIS.
Drill Press Vises • Fixture Locks • Nibblers
Punches • Rod Cutters

SNOW

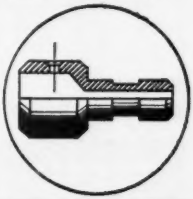
FULL UNIVERSAL MACHINES

For Top Production



Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

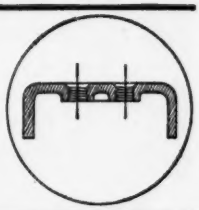
DRILLING



Crossdrill and C'T" Sink 1/16" Hole

Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine

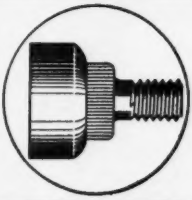
TAPPING



Tap Two #10-32 Holes

Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine

THREADING



3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine

Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

SNOW

MANUFACTURING COMPANY

435 Eastern Ave., Bellwood, Illinois
(Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

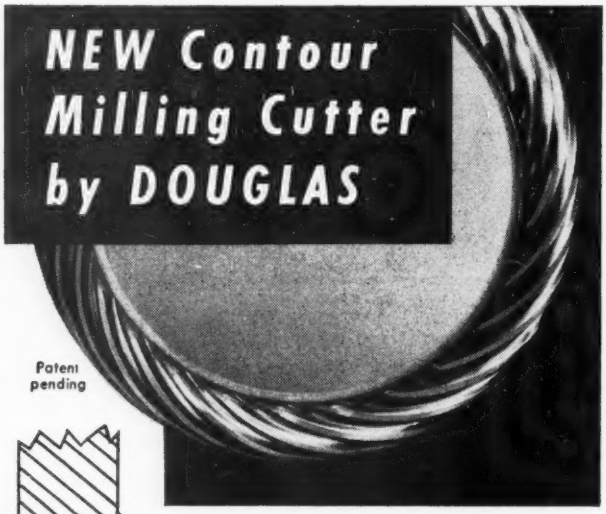
Submit Sample Parts for Production & Cost Estimates

sistant vice president, Canadian Car & Foundry Co., Ltd., Montreal.

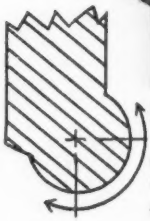
Presentation of the national awards was made at a special luncheon session, at which formal announcement also was made of the election of A. J. McDonald, vice president, American Steel Foundries, Chicago, as president of the society. Also announced as ranking officers of the society for 1953 were Carl F. Barchfeld, sales manager, The Commercial Steel Casting Co., Marion, Ohio, reelected vice president; and Arthur S. Breithaupt, vice president and sales manager, Dodge Steel Co., Philadelphia, reelected as a director and executive committee member to serve with Messrs. McDonald and Barchfeld. As president, Mr. McDonald also will serve as chairman of the board of directors and the executive and budget committees.

Others elected as members of the 1953 board of directors, together with the executive committee members, are A. T. Carter, secretary-treasurer, Tonawanda Electric Steel Castings Corp., North Tonawanda, N. Y.; J. M. Kincaid, Jr., president, Kincaid-Osburn Electric Steel Co., Inc., San Antonio, Tex.; R. A. Wahl, sales manager, Union Steel Castings Division, Blaw Knox Co., Pittsburgh, Pa.; A. M. Schlichter, president, The Pelton Steel Castings Co., Milwaukee, Wis.; P. V. Spooner, president, Missouri Steel Castings Co., Joplin, Mo.; and W. P. McGervey, Jr., president, Hanford Foundry Co., San Bernardino, Calif.

NEW Contour Milling Cutter by DOUGLAS



Patent pending

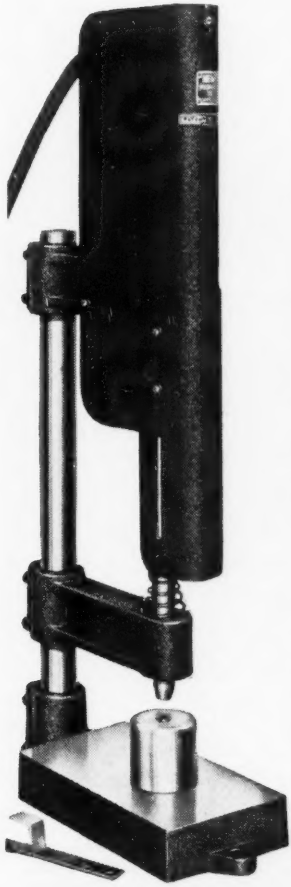


CUTTING SURFACE

Here is the patented, high helix, shear type milling cutter that does a real job on turbine compressor blades, stator vanes, buckets and nozzles, cam generating or any compound contoured surface. The teeth are always in contact with the work, they clean themselves and impart a smooth finish. Douglas milling cutters, by using a special adapter, will fit any milling machine. Standard sizes 1½" to 3½". Other sizes upon request.

DOUGLAS TOOL CO. 2300 E. Nine Mile Road Hazel Park, Mich.

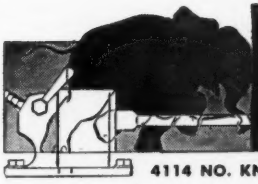
BOOST OUTPUT with *Impact* AIR HAMMER



the efficient modern method for

PUNCHING . . . . . RIVETING
ASSEMBLING . . . . . EMBOSSING
FORGING . . . . . FORMING
PEENING . . . . . MARKING
CRIMPING . . . . . CUTTING
BLANKING . . . . . COINING

Ready . . . Mead's new air-powered Impact Hammer . . . weighing only 27 pounds . . . yet having a wallop like a pile-driver! One of its outstanding applications is multiple piercing of large metal sheets before or after forming. It can punch holes as close together as 1¾" on centers. Value of the impact readily adjusted from 4,500 pounds down to only a few ounces. Set ups are quick, easy. Besides innumerable punching operations, with suitable attachments it is capable of upsetting rivets, blanking out soft materials with knife dies, light coining, forging operations, etc. Get complete facts on this versatile, handy new tool and other Mead Air Power devices. Write for Catalog.



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CATALOG READY

Send for copy of our new Air Power Catalog illustrating, describing many new man - and - money - saving devices.

Press users attending 1953 Joint Industry Conference on Punch Press Standardization are shown inspecting punch press models during the course of their tour through Clearing Machine Corporation plant.

Clearing Machine Host to Joint Industry Conference on Punch Press Standardization

Clearing Machine Corp., Chicago, manufacturer of mechanical and hydraulic presses, was host recently to press users at the 1953 Joint Industry Conference on Punch Press Standardization. The J. I. C. is comprised of engineers and technicians representing both the users and suppliers of press equipment. An inspection trip through the Clearing plant was one of the features of the conference. Conducted through the plant in small groups, the visitors were shown the manufacturing facilities and methods to produce presses that supply the production lines of industry. A recently completed 600-ton guillotine press highlighted the tour.

The regular business portion of the conference on press standardization was held at the Blackstone Hotel in Chicago. The function of the J. I. C. is to aid those concerns using high production methods by developing standards covering the die space, bed and slide areas, and other dimensions of mechanical presses that affect the ability of the user to interchange dies between presses of like tonnage capacity

SUPEREAM

REAMERS IN *Decimal* SIZES

▼ FROM .032 all the way up—Blanks can be ground to your exacting specifications and delivered in approximately 10 days. By purchasing SUPEREAM REAMERS in steps of .001 you SAVE—Time, Labor and Money in the cost of extra machining and lapping. SUPEREAM REAMERS all have ground and polished flutes and are held within .0002 tolerance.

REAMERS are also furnished in Right-hand spiral, right-hand cut, as well as Left-hand spiral, right-hand cut.

• In Emergency phone Libertyville 2-4200

Write for descriptive literature and prices.

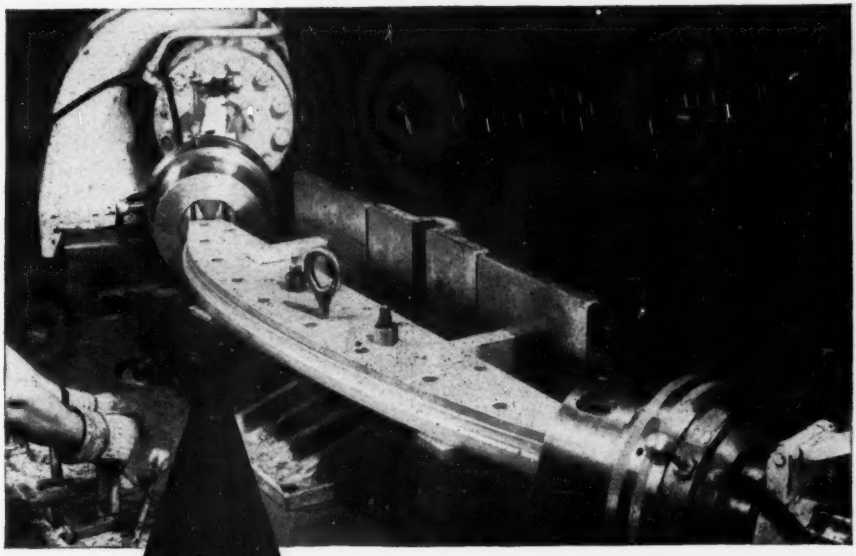
TWENTIETH CENTURY MANUFACTURING CO.

Box 429-M, Libertyville, Ill.

This stretch forming die is aluminum (Alcoa Aluminum Tool & Jig Plate) because aluminum dies are lighter, easier to handle, faster to machine and cost less to make than those of steel.

Many manufacturers are using Alcoa Tool & Jig Plate for assembly and machining fixtures, dies for low-pressure molding of rubber and plastic, and dies like this one which form aluminum sheet.

Alcoa Tool & Jig Plate is a cast product, fully normalized and strain relieved. It is available from stock in thicknesses of $\frac{3}{8}''$ to $4''$ and in dimensions up to $48'' \times 96''$. For full information on Alcoa Tool & Jig Plate, contact your local Alcoa sales office . . . or write Aluminum Company of America, 1950-E Alcoa Building, Pittsburgh 19, Pennsylvania.



This Stretch Forming Die is Aluminum

Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

and die space areas. As part of this program, the group discussed standards for four types of gap frame presses.

Carbide Inventory Plan

A carbide inventory plan, designed to reduce single-point tool stocks as much as one third, has been announced by the Carboloy Department of General Electric Co., Detroit 32, Mich., after a comprehensive study of tool inventory problems. The plan, according to Carboloy tool engineers, is simple to adopt, requiring no major changes in tool inventory procedures. The key to the plan is said to be the use of low-cost standard tools in place of the various "specials" now employed by many companies.

The standard tools are supplied in 11 specially-engineered styles, quickly adaptable for practically any special tool requirement. According to Carboloy, by drawing upon standard, stocked tools, the tools can be easily ground to specifications in the user's toolroom, or, in some instances, used "as is."

The plan, technically designated MTI-Plan (Minimum Tool Inventory), provides, in kit form, all the basic information necessary to place it into operation. Where additional advice is required, a Carboloy tool engineer will work with the user in setting up the operation.

HARGRAVE
Tested Tools
THE CINCINNATI TOOL COMPANY

QUICK CLAMPS
SAVE TIME
Individually Power-Tested for Better Performance

★ Can be applied QUICKLY, released QUICKLY.
★ Adaptable to greater variety of work. Especially useful in pattern making, foundry work, metal work, boat and shipbuilding, automobile and aircraft production.
★ Rigid at any opening—no side twisting or bending of screws.
★ Clutches insure positive locking.

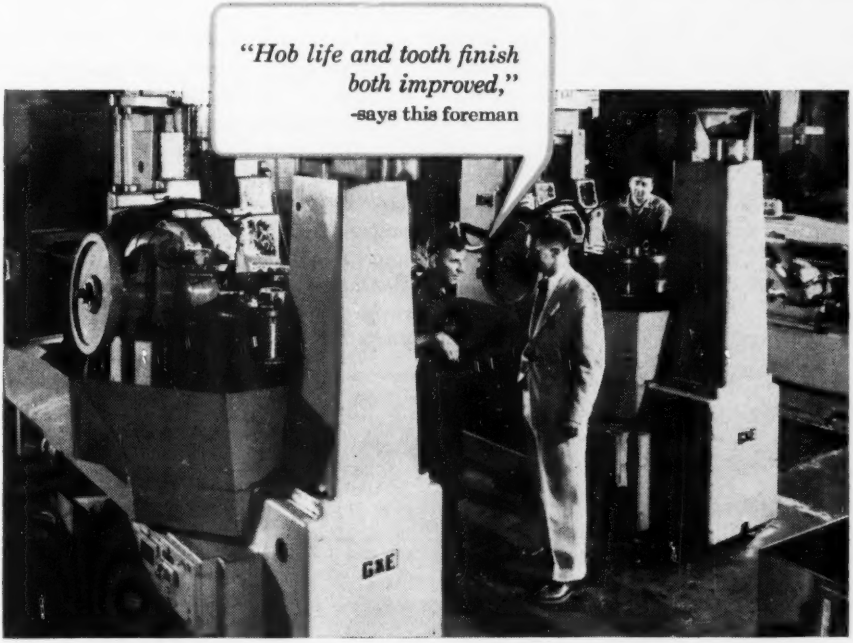
WRITE FOR CATALOG: Showing Clamps for all purposes, also Chisels, Punches, Star Drills, Brace Wrenches, Washer Cutters, File Cleaners, etc.

THE CINCINNATI TOOL COMPANY
1947 Waverly Ave., Cincinnati 12, Ohio

There is an Industrial Distributor stock near you

alloy steel drive gears for M-47 tank

hob better with GULF ELECTRO CUTTING OIL!



Operation—cutting involute teeth on alloy steel spur gears, Gould and Eberhardt Gear Hobbers; results with Gulf Electro Cutting Oil—Hob life increased 20%, scuff marks eliminated on gear teeth, and Hob grinding costs reduced.

Here's the important reason why Gulf Electro Cutting Oil produces outstanding results like these: Thanks to a special Gulf process of combining sulphur, it provides greater sulphur activity over the entire range of a cutting operation. This means longer tool life and better finishes.

Call in a Gulf Sales Engineer today and arrange to use this quality cutting oil on your tough machining operations, or send the coupon below for literature.

GULF SERVES INDUSTRY

Gulf Oil Corporation · Gulf Refining Company
719 Gulf Building, Pittsburgh 30, Pa.
Please send me, without obligation, a copy of your pamphlet "Gulf Electro Cutting Oil." MMS

Name.....
Company.....
Title.....
Address.....

Cam Design and Tool Selection Conference

Cam Design and Tool Selection is the subject of a five-day program to be held at the Rochester Institute of Technology on May 18-22. The program is designed to emphasize the techniques used by the progressive screw machine industry to increase efficiency and lower costs of production. Intended for experienced screw machine men, including process and tool engineers, layout men, cam designers, estimators, foremen, and superintendents, the program is an "idea" conference where planned course materials become the springboard for the discussion of individual problems. The wide diversity of companies usually represented is said to permit an interchange of ideas and experiences which assists everyone in obtaining solutions to many plant production problems.

The program is composed of two conferences with course materials built around a series of problems related to single-spindle equipment and a number of multiple-spindle problems. Registrations will be received for either the first or second session or for the complete five-day program. Tuition fees, which include all course materials and the special dinner meeting, are $30.00 for either 2½-day session and $50.00 for the entire five-day program. All registrants will be expected to provide for their own liv-

Men who had to "lick" the very problems you're facing designed... ROUSSELLE PRESSES
That's why they're fast, accurate, so adaptable, so easy to operate. Why maintenance is simple. Why initial cost is low . . . Often considerable savings and improved punch press operations are possible if you let our engineering staff assist you. There is no obligation. Simply furnish the details relating to your need or problem and if possible send samples or drawings of the work. You will hear from us promptly.
HORN PRESS
O.B.I. PRESS
DEEP THROAT PRESS
Sold Exclusively Through Leading Machinery Dealers
Rousselle Presses are Manufactured by
SERVICE MACHINE CO.
7627-29 So. Ashland Ave., Chicago 20, Illinois

This man is running **SIX** *drill presses*

He is performing six consecutive drilling operations with a single jig at a single working station, with less handling time, and without changing tools. He is using the Lign-o-matic turret on a standard drill press.

PUT THE LIGN-O-MATIC TURRET IN YOUR SHOP FOR A FREE 10-DAY TRIAL . . . IT WILL . . .

INCREASE PRODUCTION — Many users report more than 300% greater output in actual production. Turret indexes faster than tools can be changed or work moved to another spindle.

CUT COSTS — patented self-centering principle guarantees accuracy equal to drill press spindle. Lign-o-matic reduces tool and jig wear, cuts worker fatigue: adds up to faster work with fewer rejects. All parts completely guaranteed for TWO YEARS against defective manufacture.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper $235.00

DELIVERY — Currently, 2 weeks.

TRY IT YOURSELF at our expense. If you are not fully satisfied for *any* reason, return turret within 10 days and pay nothing.

HOWE & FANT, INC. 540 FLAXHILL ROAD SO. NORWALK, CONN.

☐ Please rush ..... Lign-o-matic turrets for (drill press make) ..... (size) ..... (quill dia.) ..... (spindle taper) .....

☐ Please send bulletin with complete information.

MY NAME _____

TITLE _____

(Attach coupon to company letterhead)

ing expenses and transportation. Additional information concerning the course, as well as registration application blanks, may be obtained by writing direct to Robert D. Pease, Associate Director, Evening Division, Rochester Institute of Technology, 65 Plymouth Avenue South, Rochester 8, New York.

D & M AUTOMATIC PRESS GUARD

No Springs • No Cables • Fits Any Machine • Low Initial Cost • Low Maintenance •

• This punch press guard meets the most exacting standards of safety engineers and safety laws. Permits operator to feed the press without hindrance. *Write for complete information.*

Immediate Delivery

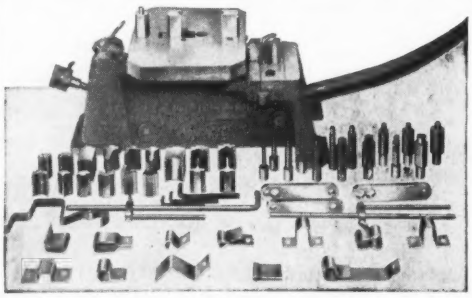
D&M GUARD Co.

895 Military Rd., Buffalo 17, N. Y.

Houghton Forms Subsidiary Company for Synthetic Packings

The construction of a new plant for the manufacture of synthetic rubber packings, and the formation of a subsidiary company for this purpose, has been announced by E. F. Houghton & Co., Philadelphia, Pa. The new plant, already in production, is being operated as Houghton Vix-Syn Company and is located at 140 Washington St., S., Hopkins, Minn. It was built to provide additional manufacturing facilities for Houghton in the middle and far western sections of the country.

The building covers 12,000 square feet and will be wholly devoted to the manufacture of homogeneous synthetic rubber packings, O-rings, and custom molded rubber products. According to the manufacturer, the additional plant is necessary to meet increasing demand for packings used to seal hydraulic and pneumatic mechanisms of all types, including presses, machine tools, automotive, and aircraft hydraulically-controlled devices. William F. MacDonald, president of E. F. Houghton Company, is also president of Houghton Vix-Syn Company, and the sale of Vix-Syn rubber products will be handled by the parent company.



Multiform

BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds Into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

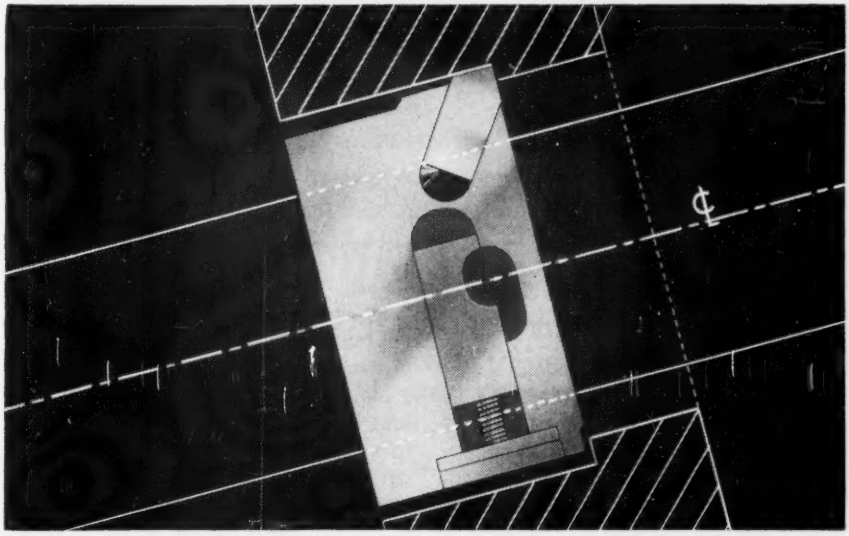
AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6 M Kalamazoo, Mich.

Get fast, positive line boring accuracy for 2½" to 17" dia. with . . .



DAVIS SINGLE CUTTER MICROMETER ADJUSTABLE BLOCKS

HERE'S the way to boost efficiency on general purpose jobs that demand rigidity and a wide range of cutter adjustments.

In addition to regular line boring with either standard or special bars, Davis tools with the exclusive adjustable feature are easily adapted to counterboring, undercutting, grooving, facing or chamfering. Block and cutter adjust as a unit to assure full cutter support at all settings.

Made of high grade tool steel, hardened and ground, the blocks can be furnished with High Speed Steel, Cobalt, Stellite, Tungsten Carbide tipped or Tantalum Carbide tipped cutters.

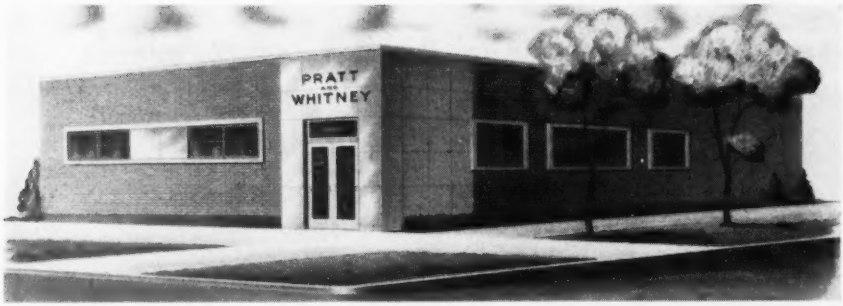
For details, write for bulletin No. 602.

If Davis can't bore it, it can't be done!

DAVIS BORING TOOL DIVISION

GIDDINGS & LEWIS MACHINE TOOL CO., FOND DU LAC, WISCONSIN

Builders of plain and micrometer adjustable block type boring tools; line boring bars; special boring tools; car wheel boring tools; planer, vertical boring and turning mill tools; Quick Change arbors and sleeves.



New and larger Pratt & Whitney Chicago branch office

Pratt & Whitney Relocates Chicago Branch Office in New, Larger Quarters

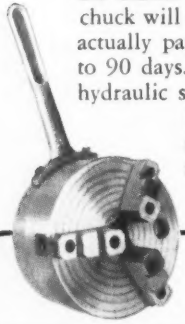
Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn., has announced the relocation of its Chicago branch in new, larger quarters with adequate parking for visitors at 4649 W. Fullerton Ave., Chicago 39, Illinois. The new building was specially planned and erected to provide better facilities for carrying a more comprehensive stock of regularly listed P&W cutting tools and gages and to afford adequate office area for the factory-trained sales and service personnel associated with Pratt & Whitney and its subsidiary, Potter & Johnson

Labor Saving Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days. Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.

Write for bulletin 201 today.



CHUCK DIVISION
THOMAS HOIST CO.
28 S. HOYNE CHICAGO 12, ILL.

WRITE FOR FREE Hassall decimal-equivalent wall chart

In such popular demand (we've given away 50,000)—we've made it better. The new chart is far easier to read! In three colors to automatically signal decimal-equivalents of fractions. The special products which frame the chart are a constant reminder of a good source of cold-headed parts.

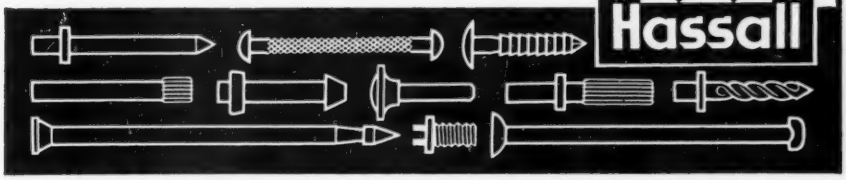
ESTABLISHED 1850

SPECIAL NAILS RIVETS SCREWS

Hassall

JOHN HASSALL, INC.

394 OAKLAND STREET • BROOKLYN 22, N. Y.



YOU CAN *Lower* YOUR
METAL CUTTING COSTS

MILFORD
"Multiple-Pass" Milling
is PART of the ANSWER

SHARPER --
MORE UNIFORM --
CLEANER TEETH --

Milled by multiple passes of the cutters, keener, more uniform teeth are produced, absolutely necessary for faster, smoother cutting of metals. The final burnishing pass produces the smoothly finished teeth, which assure fast, effective chip removal.

ALL MILFORD POWER HACK SAW BLADES . . . give you faster cutting with teeth that are sharp, and stay sharp longer.

STANDARD OF QUALITY THE WORLD OVER

THE HENRY G. THOMPSON & SON CO.

SAW BLADE SPECIALISTS
FOR OVER 75 YEARS
NEW HAVEN 5, CONNECTICUT
PROFILE BLADES AND BAND SAW BLADES
HAND AND POWER HACK SAW BLADES

MILFORD
Sold through MILFORD Distributors who render a service tailored to your needs. The industrial distributor is familiar with the requirements of industrial users in his area. His is a prompt personalized service, as near as your telephone.

Co., Pawtucket, Rhode Island.

The new office will be under the management of C. G. Cunningham, district manager; F. A. Armstrong is district sales manager for cutting tools and gages. The staff includes H. S. Brown, L. J. Feeley, H. W. Glenn, W. Graska, O. R. Hess, C. R. Hull, T. L. Jenner, E. Kenneth Kennedy, Arthur LaDucer (Milwaukee), W. C. Mullin, F. L. Oberbeck, P. C. Renno, Fred D. Watson (Milwaukee), and A. B. Zimmerman.

Welding & Allied Industry Exposition

The Welding & Allied Industry Exposition, sponsored by the American Welding Society, 12 E. 41st St., New York 17, N. Y., is scheduled to be held June 16 through June 19, 1953, at the Shamrock Hotel Hall of Exhibits in Houston, Texas. Key welding interests from all over the country are expected to attend the all-welding exhibit. A wide variety of products will be shown, including aluminum alloys and fluxes, silver brazing flux, stainless steel solder, positioners, contour and radius markers, centering heads, welding rods, electrodes, castings, miscellaneous brazing alloys, electrode holders, weld cleaning tools, magnetic partical inspection instruments, arc welding equipment, welder caps, lighters and chains, portable industrial x-ray units, regulators, and torches.

Action-type demonstration displays will be presented by Adams Alloy Company, All-State Welding Alloys Company, Dockson Corporation, Handy & Harman, Hobart Brothers, J. M. Ragle Industries, Sonoflux Corporation, and Stoody Company. A film on arc welding electrode manufacturing will be shown by Alloy Rod Company.

JOIN INDUSTRIAL AMERICA—

Heat Treat High Speed Steel

The SENTRY Way!

"ALWAYS ON DUTY"

SENTRY MODEL YP
Vertical model for long, slender drills, reamers broaches, etc.

SENTRY MODEL 2Y
For small tools, cutters of moly, tungsten and cobalt high speed steels.

IBM

Sentry Keeps IBM Heat Treating Free of Oxidation-Decarburization

The Sentry Furnaces installed in the Poughkeepsie, New York plant of International Business Machines Corp. are used to harden high speed and high carbon, high chrome steel tools and dies employed in the manufacture of IBM Electric Typewriters, Key Punches, Sorters and Proof Machines.

Tools which are Sentry heat treated include saws, milling cutters, lathe tools and form cutters, blanking and forming dies, and punches. IBM, through Sentry Furnaces and Sentry Diamond Blocks, consistently produces these tools with optimum hardness, entirely free from oxidation or decarburization.

Sentry 2Y and 5Y Installation at International Business Machines Corp., Poughkeepsie, New York

Request Catalog B-1

SENTRY DIAMOND Blocks

THE SENTRY COMPANY

FOXBORO, MASSACHUSETTS

INDUSTRIAL ELECTRIC FURNACES AND EQUIPMENT FOR HEAT TREATMENT OF METALS

G. A. Gray Announces Expansion Program

The G. A. Gray Co., Cincinnati 7, Ohio, has announced the start of a substantial expansion program which will include two sizable building additions and the creation of two new parking lots. The latter work involves the development of old as well as newly-purchased property. The expansion program, together with important plant modifications, will make possible additional space for the installation of many new major machine tools.

According to the company, the program will increase the efficiency of its operations and will make it possible to add to its employee force by providing new locker rooms and other improved facilities.

A product for every PORTABLE GRINDING job!

Take a look at the jobs you do with portable grinding equipment. How can you be *sure* the method you're using is the fastest, the most economical? The best way is to ask CARBORUNDUM—your single source for *every* abrasive product you can use... grinding wheels, discs or any form of coated abrasives. You can choose from over a dozen products by CARBORUNDUM for portable grinding of all types.

CALL YOUR CARBORUNDUM SALESMAN OR DISTRIBUTOR for experienced counsel and prompt delivery from complete stocks. Or write to us at Dept. M M81-39A.

CARBORUNDUM
TRADE MARK

the ONLY source for EVERY abrasive product you need

"Carborundum" is a registered trademark of The Carborundum Company, Niagara Falls, N. Y.

81-39A

When you look at air tools . . . LOOK INSIDE

THE NEW WAY

A one-piece shaft, with keys to drive the rotor which "floats" on the shaft; only one bearing needed at center of tool.

An ordinary air tool has a two-piece shaft, joined by a male and female tang. This tang drive is subject to excessive wear, even when double bearings are used for support. When wear occurs, it means replacement of the entire shaft, including an expensive rotor.

A Buckeye air tool has a one-piece shaft, connected to the rotor by two keys; the rotor "floats" on the shaft. The keys are not subject to as much wear as the tang drive, and even when wear does occur, the keys are easily replaced at very low cost. The shaft and rotor continue in service.

The point is simply this: you can expect better service — at lower cost — from your Buckeye tools.

Buckeye Tools
CORPORATION
DIVISION 17 • DAYTON 1, OHIO

Portable Air and Electric Tools for Industry

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

Punch Hardening Service

Robert H. King, vice president of Pivot Punch & Die Corp., North Tonawanda, N. Y., manufacturer of straight-ground whip-sleeved punches, has announced a new hardening process for its punches of unusual interest to the metal trades industry. Known as the "Ton-dra" Treatment, the process, which produces an extremely hard, wear-resistant surface on the piercing diameter of punches, is employed as standard practice in the manufacture of all "xs" and ys" series punches and does not involve any additional cost over standard catalog prices.

EISLER JIG BORING
CAM MILLING
A SPECIALIZED CAM MILLING SERVICE... JIG BORING... SPOT WELDING... CONTRACT PRODUCTION
...EXPERIMENTAL DEVELOPMENT
EISLER ENGINEERING CO., Inc.
734 So. 13th St. Newark 3, N. J.

Open House Held by Adamas in Dearborn

Over 800 customers attended the two-day open house party held recently in Dearborn, Michigan, by Adamas Carbide Corp., Harrison, N. J., celebrating the establishment of the Adamas' Detroit stock. The party was held at the new location of the Adamas Michigan representative, Quint-Alloy Corp., 23141 Ann Arbor Trail, Dearborn. Among the guests were engineering and purchasing personnel from the large automotive manufacturers and from carbide tool and diemakers. The River Rouge plant of the Ford Motor Company led in the number of individual guests.

Carl Krueger of Gairing Tool Company won the door prize of a Sylvania clock radio, and Joseph Filardo of Carbide Tool Company won the carbide gram weight guessing contest.

Columbia
TOOL STEELS for all tools for all purposes
★
HOT WORK-SHOCK RESISTING:
Formite Formite No. 2
Firedie Buster C.E.C.
TOOL COLUMBIA STEELS
COLUMBIA TOOL STEEL COMPANY
Main Office & Works Chicago Heights 6, Ill.

HARDENED and GROUND HSS BLANKS
Any decimal diameter to 5/8"—in any length. Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.
Write for price list D-2
WILLIAM T. HUTCHINSON COMPANY
235 Main St. Orange, N. J.

- **honing machines**
  15 sizes: diameters from 1/4" to 40" with strokes from 12" to 144"
- **honing tools**
  sizes to 50"
- **honing fixtures**
  for your special purposes
- **aircraft rod borers**
- **piston ring lapping**

WRITE TODAY *for your copy of our honing bulletin.*

C. ALLEN FULMER CO.

1233 First National Bank Bldg. **Cincinnati 2, Ohio**

Eclipse Counterbore Celebrates 40th Anniversary

The Eclipse Counterbore Company, founded in Detroit in 1913 to manufacture a new interchangeable type cutting tool, is currently celebrating its 40th anniversary. From a start in the basement of the founder's home, it soon became necessary to set up a small shop to produce the tools in larger quantities in order to meet the demands of manufacturers. The second home of Eclipse was space rented in the loft of a building in downtown Detroit. Month by month, the volume of business increased and Eclipse outgrew the facilities of its modest quarters. It then became evident that a company owned plant must be provided.

By the time the United States had entered World War I, Eclipse was in operation on St. Aubin Avenue. Over a period of 30 eventful years, this remained the home address of the firm. In 1929, a two-story building was erected, and in 1939 a further addition, the hardening department, was built north of the office building.

In 1920, Eclipse gave industry the multi-diameter cutter. In 1922, the balanced drive inverted counterbore was originated and developed by Eclipse engineers. One of the most important of all the company's developments was the Radial

Slashes Costs On Reaming Jobs

Staples CARBIDE-TIPPED SHELL TYPE EXPANSION REAMER *

Here's how you can triple your tool life on all types of line and piloted reaming jobs—use Staples Shell Type Expansion Reamers. To compensate for wear, reamer shell expands to original diameter by driving it up the tapered arbor. Re-expand shell until maximum carbide utility is reached. A new tool is obtained simply by replacing the worn shell—a standard item. Many design variations of this tool are possible, including use of two shells of different diameters for step reaming.

For maximum tool economy, specify Staples Carbide-Tipped Circular Tools for reaming, core drilling, spotfacing, counterboring and end milling jobs. Quick delivery of standard tools from stock. Special tools designed to your requirements. Write for tool catalog.

* Patented

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio

Distributors in Major Cities

Staples CARBIDE-TIPPED CUTTING TOOLS

A complete line of Circular Carbide-Tipped Cutting Tools
Expansion Reamers – Special Tools

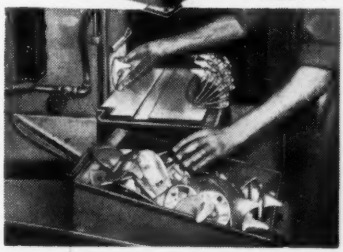
9 WAYS to Save...

by Porter-Cable

Abrasive Belt Grinding

1. **Initial Cost** is lower
2. **Installation Cost** is less
3. **Maintenance** is minimized
4. **Skilled labor** is not required
5. **Production is increased** — labor cost on each job is cut
6. **Inventory** of milling cutters or grinding wheels is eliminated
7. **Fixtures** are less expensive, frequently eliminated
8. **Polishing Time** is greatly shortened
9. **Machining Allowances** can be reduced — thus saving material

Model BG8-FT9

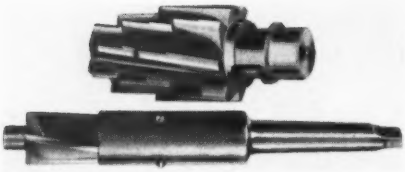


For example—rims of the aluminum covers shown at the right are ground in 5 seconds without a fixture, with no set up time required, and no loading time. Operator holds the pieces free-hand against the fast-moving abrasive belt. Fine, straight line finish is attained, with the surface ground to a true flat.

Free! A 32-page fact-packed booklet with 46 examples of how Abrasive Belt Grinding ups output, slices costs. Mail coupon for your copy.

PORTER-CABLE Machine Co.
1365 N. Salina St., Syracuse 8, N. Y.

Name.....**Title**.....
Firm.....
Address.....
City.....**State**.....
In Canada write: Strongridge, Ltd., London, Ont.



(Top) A modern multi-diameter carbide-tipped Eclipse cutter. (Bottom) The original Eclipse interchangeable single-diameter counterbore created in 1913

Drive design for attaching and driving interchangeable cutters. In 1948, the firm created the Quick Detachable Taper Drive.

When World War II threatened, Eclipse prepared itself for the task ahead by building and equipping the first unit of the Ferndale Plant. Continual enlargement of this plant and a well-planned conversion program made it possible to finally swing all production over to Ferndale, once the extreme rush of initial war tooling was underway. Today, Eclipse cutting tools are required in the present defense program and are furnished to prime and subcontractors for the manufacturing of critical Diesel engines, airplane engines, propellers and other plane parts, guns, shells and rockets, tanks, tank engines, tank transmissions, tractors, trucks, and many other defense items.

First Commercial Press for "Hidraw" Demonstrated for Aircraft Officials

Representatives of major aircraft manufacturers gathered at The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, recently to watch a demonstration of the first commercial press built

NEW!
KOEBELITE
TRADE-MARK
Cemented Diamond Particles
More efficient than conventional single diamond tools — with MUCH LONGER LIFE.
Reduces set-up time — increases production.
Now ready and proven: Koebelite CDP (Cemented Diamond Particles) Tool for Ex-Cell-O and J & L Thread Grinders, at left.
KOEBEL DIAMOND TOOL COMPANY
9456 GRINNELL AVENUE, DETROIT 13, MICH.
FIRST to give diamond users the advantage of diamonds set in powdered metal

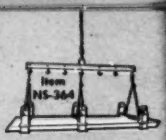
CONSULT PS FOR THE BEST *Materials Handling Equipment*

Item B-218

WELDER'S TRUCK

Item B-470

BARREL and BOX SKID



Item NS-364

SHEET STEEL GRAB

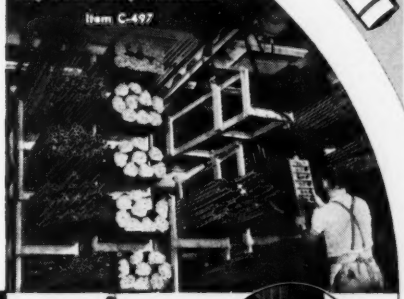
Item C-465
$30.25

Vertical DRUM LIFTER

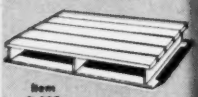
For handling open and closed steel drums in vertical position, by crane or hoist. All-steel, with heavily welded chain. Sure-hold safety barrel grip. Saves plant space. Use for either high or low ceiling condition.

PORTABLE
Heavy Duty
BAR RACKS
Any Rack Easily Accessible

Item C-497



Item B-205



Item B-539

All metal PALLET

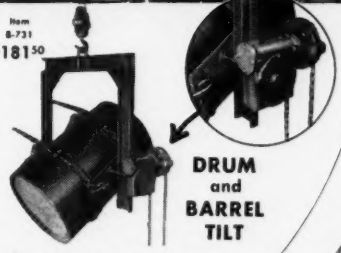
Item 50973

AIR SAVER leak proof **AIR VALVE**

STACKING RACK

Item C-496

Tiered by Single Operator. Note How Ends Lock in Place



Item B-731
$181.50

DRUM and BARREL TILT

A barrel tilt for controlled, precision dumping or pouring. Ideal for chemicals, solvents, powders, etc. Turns 360° through worm drive. Equipped with two safety type locking devices and all-steel, welded yoke. Hand-operated chain drive.

Item NS-249

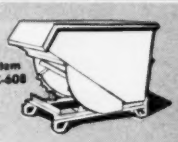
WOOD BOX metal bound

Item B-488

CARBOY TRUCK

Item S-703

Industrial DUST PAN



Item C-608

Automatic END DUMP

Item S-913

CORE RACK

Item NS-415

UTILITIES RACK on wheels

Item D-28 (Box)
Item C-451 (Stand)

Sloped Bottom BOX and STAND

Item S-911

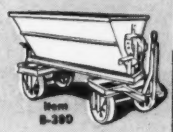
BARREL TRUCK loads automatically

Item B-391

MULTI-PURPOSE CART

Item B-746

CORRUGATED BOX with legs



Item B-380

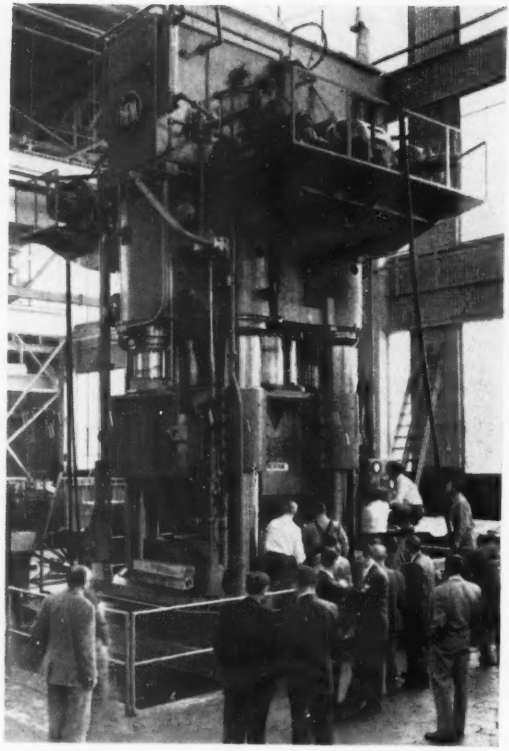
TRAILER TRUCK side dump

WHEN ORDERING always give "Item" number. **ALL PRICES** are f. o. b. Detroit. Prices are subject to change without notice. Write for Catalog.

DESIGNED AND MANUFACTURED BY

Palmer-Shile Co.

16022 FULLERTON AVE., DETROIT 27, MICH.



Some of the aircraft manufacturers who visited The Hydraulic Press Manufacturing Company during the two-day demonstration watch the first commercial model Hidraw press (7,000-ton) form a part.

for "Hidraw"—a new method for deep drawing metal parts by a combination cushion and rubber pad process. The Hidraw process was developed and perfected on a two-year production basis by Consolidated Vultee Aircraft Corp., Ft. Worth, Texas. After proving its merits, Convair came to H-P-M for assistance in building the 7,000-ton production size machine demonstrated.

Topping the list of officials at the demonstration were G. R. Gordon, assistant chief tool engineer, and R. C. Rudell, equipment engineer, both of the Fort Worth Division; and A. P. Higgins, manager, Plant No. 2, San Diego Division, all of Convair, who helped develop the process. Messrs. Gordon and Rudell worked closely with H-P-M engineer F. E. Sebring in building the first commercial model. To the basic Hidraw operation, H-P-M engineers, in cooperation with Convair and other aircraft manufacturers, added design features to incorporate the Guerin and die quenching operations.

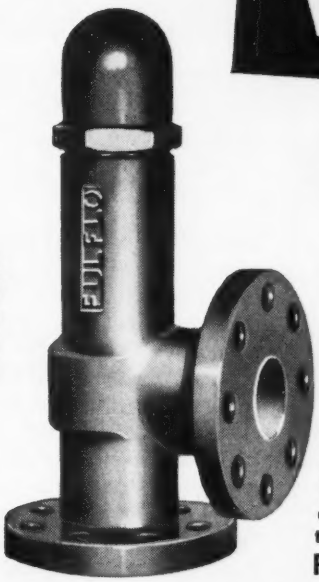
You Need an Extra Hand Now
to Speed Up Production!
HEIMANN TRANSFER SCREW SETS
Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!
IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.
HEIMANN MFG., CO. ● URBANA, OHIO

Engineers agree that the BEST designs are the SIMPLEST

EFFICIENTLY SIMPLE

TRADE MARK
"FULFLO"
REG U S PAT OFF

OIL BY-PASS RELIEF VALVES



BRASS OR CAST IRON Standard or Flange Types

To maintain specific, predetermined pressures on machine tool hydraulic mechanisms, ram presses, Diesel and oil-burning equipment.

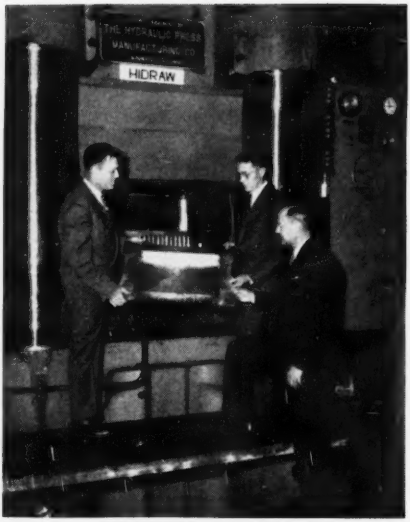
NON-CHATTERING . . . NO MAINTENANCE.
INSTALL . . THAT'S ALL
for pressures from 0 to 500 lbs.
Pipe sizes from ¼" to 2".

WRITE on your letterhead for your personal, professional copy of valuable, information-packed FULFLO MECHANICAL DATA BOOK

TRADE MARK "FULFLO" REG U S PAT OFF

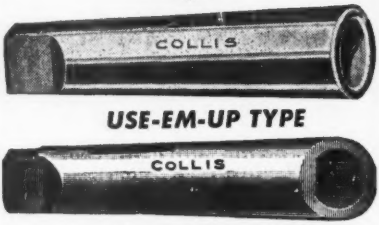
THE FULFLO SPECIALTIES CO. Inc.
BLANCHESTER, OHIO

Advantages of the Hidraw process alone, without considering the latter two operations, are said to be as follows: (1) perfect surface finish of the part due to the fact that the part is in contact with rubber and male portion of the die only while the draw operation is being performed; (2) uniform thickness and maximum stretching because the part is formed by fluid pressure and is not subjected to an ironing operation; (3) parts with contour difficult to form can be formed straight from the blank to the finished part since the rubber acts as a fluid pressure medium and there is no unsupported metal between the point of contact with the punch and the actual draw ring itself; (4) inexpensive tooling, especially where there are thousands of parts and small production lots; and (5) elimination of expensive hand work in removing wrinkles encountered in the Guerin operation. It is also claimed that parts produced by the drop hammer method and which require highly skilled operators can be produced by the Hidraw process by unskilled operators.



Examining the first part produced at H-P-M's Hidraw demonstration are (left to right) G. R. Gordon, assistant chief tool engineer; F. E. Sebring, H-P-M engineer; and R. C. Rudell, equipment engineer. Messrs. Gordon and Rudell are from Convair's Ft. Worth, Texas, division and played a key role in developing the Hidraw process.

QUALITY ACCURACY COLLIS DURABILITY SERVICE



USE-EM-UP TYPE

STANDARD TYPES

SLEEVES
AND
SOCKETS
AND A
complete line of COLLETS

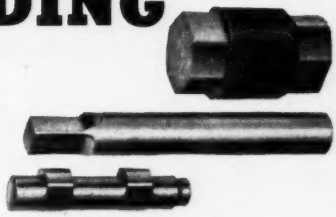
• COLLIS Taper Tools are made by men skilled in this type of manufacture. Users get long satisfactory service from COLLIS Equipment and find the answer to all drilling, reaming, and tapping needs in the COLLIS line. We can give prompt service on orders for Lathe Centers, Arbors, Drill Drifts, and Magic Type Chucks as well as on Sleeves and Sockets and Collets.

THE COLLIS CO.
DEPT. A, CLINTON, IOWA

Let us relieve your shop of production headaches by taking over these specialized machining jobs

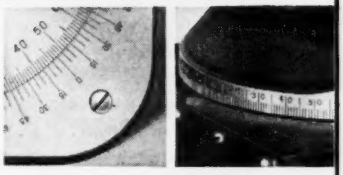
• CAM GRINDING

Our plant is equipped for production grinding of small irregular forms such as cams, form punches, etc.



• DIAL GRADUATING

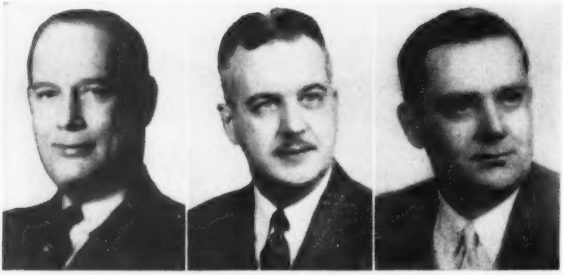
We are also equipped to machine graduations on dials of all types in small lot or production quantities.



Send a sample or print for quotation.

ROYAL OAK TOOL & MACHINE CO.

29800 Stephenson Hwy. Royal Oak, Michigan



(Left to right) Henry E. Sanson, Henry H. High, and Harry J. Lavery

New Company Formed to Manufacture Industrial Oils and Chemicals

Henry E. Sanson, president of Henry E. Sanson & Sons, Inc., has announced the formation of the Henry E. Sanson & Sons Mfg. Corp., 2215-25 N. American St., Philadelphia 33, Pa., which will manufacture industrial oils and chemicals. The company will produce, besides standard items, several new items applicable to the metal-working field and fuel oil treatment; namely, "Powder'd Oils" for cutting and grinding operations; "Syn Solv" fuel oil treatment; C.T.T.D. for difficult cutting, tapping, and threading operations; and "Draw Free" drawing compounds.

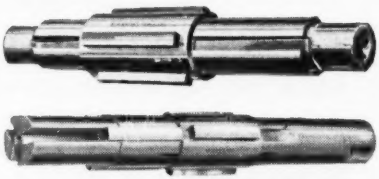
Henry E. Sanson, who started his career with the Clarkson & Ford Oil Company in 1913, has been named president of the new corporation. Henry H. High, formerly chief works chemist at E. F. Houghton Company, is executive vice president, and Harry J. Lavery, a manufacturing chemist, is vice president in charge of production.

Nicholson Expanding Mandrels

SAVE TIME LOST

Providing Solid Arbors

Records in many shops show Nicholson expanding mandrels actually get operations completed in less time than was formerly consumed in providing solid arbors. In cases this results in a tremendous cut in "down" time. Set of 14 Nicholson mandrels replaces 209 solid arbors. For all bores 1/2" to 7"; sold singly or in sets.



For details send for **BULLETIN 750**
136 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

TREET-ALL

the HEVI DUTY *Multi Purpose* FURNACE

for

TOOL ROOM AND EXPERIMENTAL HEAT TREATING

With a maximum temperature of 1850° F., the TREET-ALL can easily handle your scale free hardening, carburizing, dry cyaniding and silver brazing.

The alloy muffle and gasketed door form a tight seal which simplifies atmosphere control. The furnace, quench tank, cabinet and controls form a compact, completely wired unit.

Write for Bulletin HD-1147-BB

HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES HEVI-DUTY ELECTRIC EXCLUSIVELY
DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN

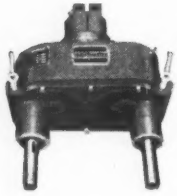
Norton Grinding Machine Division Holds Open House

Norton Co., Worcester, Mass., took the wraps off the new $6,000,000 expansion of its Grinding Machine Division March 31 when editors of newspapers and technical magazines toured the plant—the first group to visit the new structure since it was completed. Editors' Preview was the opening event in a week-long open house. The plant is said to provide increased capacity for the production of Norton's complete line of 45 different types of precision grinding and lapping machines. The new plant, built to meet the demands of the present defense effort, consists of a 740 x 300-foot factory which adjoins a 360 x 100-foot office building. A large parking area for employees and visitors has also been provided.

Among the many features of the new plant are straight-line production methods, new modern machine tools, special materials handling equipment, air-recirculating dust control equipment, forced ventilation providing three complete air changes per hour, and many others. The factory itself is of single-story modern construction, providing 275,000 square feet of working space and enlarging the company's machine tool manufacturing capacity by nearly 50 per cent.

Supplies and raw stock are now received at one end of the plant and progress through the five 60-foot bays toward the final assembly floor

Yes! **THRIFTMASTER** *makes* ***ALL TYPES*** *of* **DRILLHEADS**



Universal Joint Drillhead . . . Full Ball or Bronze Bearing Construction. Standard and Heavy Duty. From ½" Minimum Centers up. Capacities to 1" in Steel.

Gear Driven Eccentric Type Adjustable Drillhead . . . Enclosed, Full Ball Bearing Construction.

Special Fixed Center Drillhead . . . Full Ball Bearing Construction.

- **We Stock or Can Build the Right Drillhead for Your Job.**
- **Write for Complete THRIFTMASTER Catalog or phone for a rush, on-the-spot, quote.**

Subsidiary of Thomson Industries, Inc.

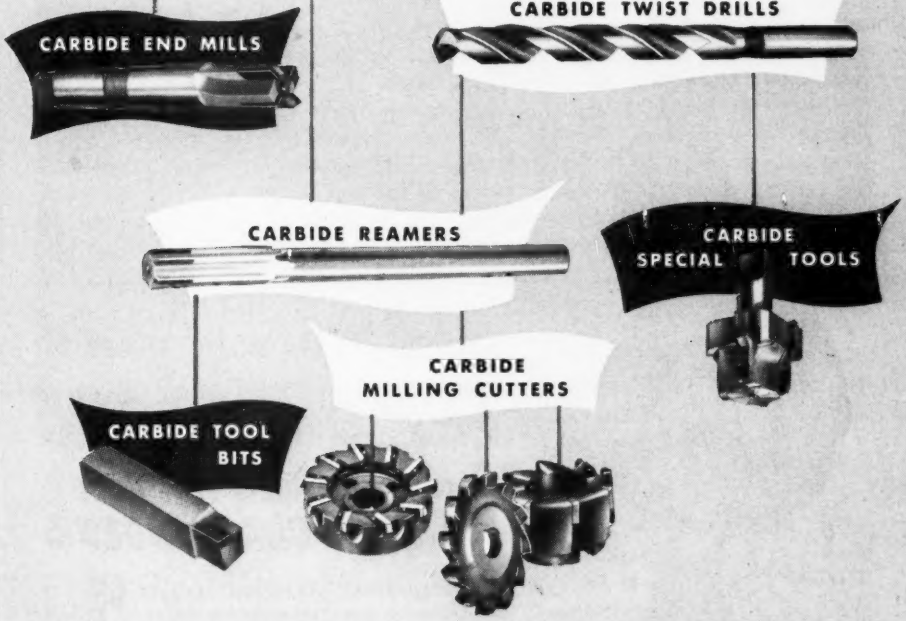
THRIFTMASTER *Products Corporation*

1034 N. Plum St.
Lancaster, Pennsylvania

***Also Makers of* DORMAN AUTOMATIC REVERSE TAPPERS**

STANDARD CARBIDE TOOLS

by SUPER



The Super line of carbide tools features aggressive and up-to-the-minute thinking in cutting tool design. More than 50 items in a complete range of sizes are carried in stock in warehouses conveniently located in New York, Detroit, Chicago and Los Angeles.

Super TOOL COMPANY

21650 Hoover Road, Detroit 13, Michigan

also 5210 San Fernando Rd., Glendale 3, California

New plant of Norton Grinding Machine Division, Worcester, Massachusetts

and shipping area. Straight-line production greatly simplifies the problems of quality control and expediting.

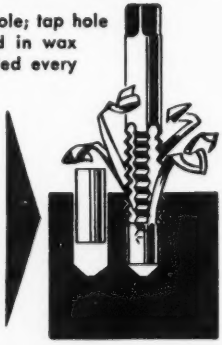
A new industrial 277-volt lighting system has been installed which provides an average of 40 foot-candles at the factory floor and 60 foot-candles in the office. The system was designed jointly by Norton and Westinghouse engineers to fulfill requirements not met by existing standard fixtures. Much of the materials handling formerly done by electric trucks is now accomplished by floor-operated cranes supported on craneways independent of the building structure. Hand trucking between machines has been reduced to a minimum. There are several

STOP the major cause of
TAP BREAKAGE

increase tap life 5 to 10 times
with **TAP-CARTRIDGES**

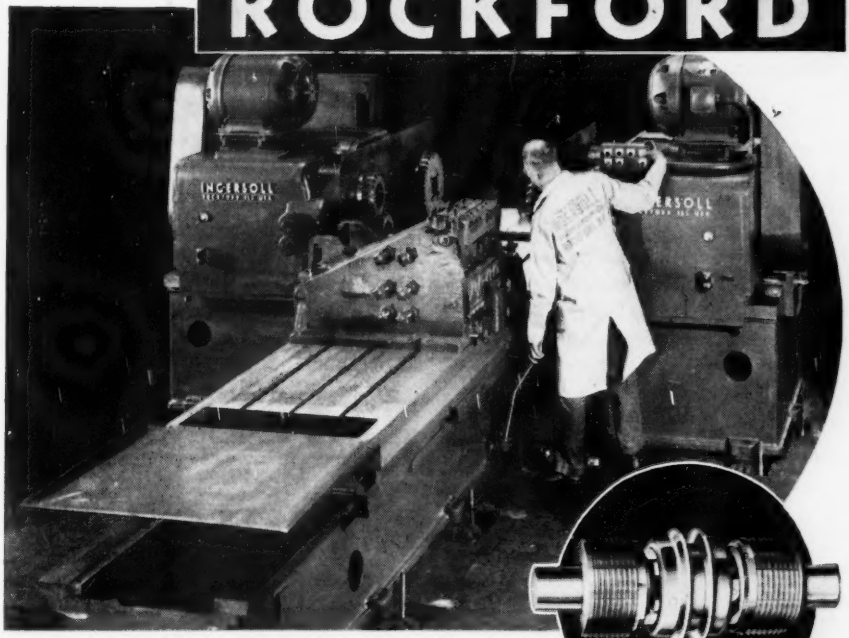
Drop TAP-CARTRIDGE into drilled hole; tap hole through cartridge; chips are imbedded in wax and forced out of hole. Tap is protected every thread of the way.

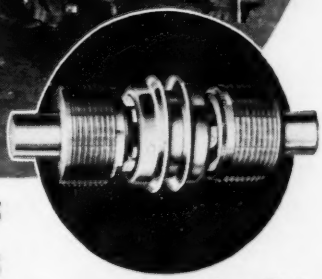
- very economical
- saves time and labor
- eliminates torn threads
- no cleaning-out operation required
- facilitates thread-cutting to bottom of hole
- available for tap sizes from No. 2 up and for any depth of drilled hole



For full details write to the . . .
TAP-CARTRIDGE CO.
1638 CENTRAL PARKWAY
CINCINNATI 10, OHIO

CLUTCHES by ROCKFORD





6-Spindle Machine Does Multiple Milling Jobs

INGERSOLL Milling Machine Company designs and builds special machines to meet customer requirements. By accepting responsibility for performance and guaranteeing production rates and accuracy, INGERSOLL assures customer satisfaction. ROCKFORD CLUTCHES help assure dependable performance. Let ROCKFORD clutch engineers help your designers specify reliable power transmission controls for *your* machines.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION BORG-WARNER

300 Catherine Street, Rockford, Illinois, U. S. A.

receiving and shipping platforms easily accessible to motor trucks.

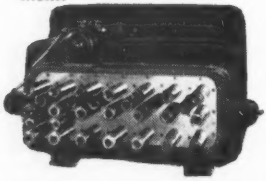
The construction of the building itself has been done with efficient upkeep in mind. The walls are cinder block faced with brick. Aluminum window sash, galvanized steel exposed metal parts, and Transite siding make up the remainder of the exposed siding. The roof is of tar and gravel. Inside construction is likewise designed for a minimum of upkeep. Office spaces are equipped with acoustic ceilings and are air conditioned throughout. A 15,000 square foot mezzanine houses locker rooms, wash rooms, a power substation, and miscellaneous spaces, such as stores, classrooms, and a foremen's club room.

Included in the plant is a completely modern cafeteria equipped to handle 386 people at one sitting. Floor-to-ceiling glass on two sides of the cafeteria make it extremely light and pleasant. The current employment in the Grinding Machine Division is approximately 1,500, which is 400 more than were employed prior to the expansion.

Twelve Machine Tool Advertisements Receive Awards in N.M.T.B.A. Advertising Competition

Twelve machine tool advertisements have received awards in an advertising competition sponsored by the Advertising Committee of the National Machine Tool Builders' Association. The award certificates were presented to the winning companies at the asso-

8-Spindle Heavy Duty Ball Bearing Drill Head. All spindles have end adjustment.



29-Spindle Heavy Duty Ball Bearing Drill Head. All spindles have end adjustment.

Use MICHIGAN DRILL HEADS

Combine Machining Operations on a Single Machine with One Operator

- DRILLING
- REAMING
- TAPPING
- SPOT-FACING
- CHAMFERING
- COUNTERBORING
- NUT DRIVING
- BORING

Reduce labor costs. . . . Cut production time. . . . Save floor space. . . . Improve accuracy. Do all the jobs listed at the left faster, better. Many Multiple Heads available. Let us show you how your costs can be reduced.

Write, Telephone or Wire Today for free literature.

MICHIGAN DRILL HEAD CO.

971 E. EIGHT-MILE ROAD • HAZEL PARK, MICH.

ELECTRICAL CONTROLS FOR INDUSTRY

NEU-TROL
ELECTRO-MAGNETIC CHUCK CONTROL

50 to 15,000 Watts . . . 60 to 20,000 Sq. In. Chuck Area.

Releases and demagnetizes work pieces simultaneously. No time lost. No damage to work or chuck face. Protects chuck from voltage surges. Speeds production.

ELECTRO-MATIC RECTIFIER

50 Watts to 40 Kilowatts

Engineered for dependable power conversion in constant year after year service. Quiet and efficient. For all industrial applications.

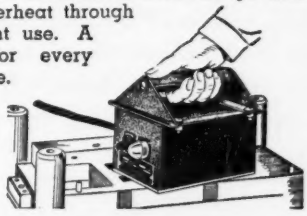
NEUTROLATOR

NEUTROL CHUCK CONTROL and HOLDING POWER REGULATOR

Combines the advantages of NEU-T-ROL with the benefits of absolute voltage regulation. Control of holding power is infinitely variable through entire dial range. Best holding power predetermined for an operation is automatically repeated. Assures true parallel grinding. Manual or automatic control models.

ELECTRO-MATIC A.C. DEMAGNETIZER

Demagnetizes dies, punches, cutters, tools that have been magnetized from any source. Works by simple contact. Operates on standard A.C. voltage. Will not overheat through constant use. A size for every purpose.



All Models Fully Warranted

Special Models Engineered to Meet Every Need

Your Inquiries Will Be Promptly Answered Without Obligation.

ELECTRO-MATIC PRODUCTS CO.

2235-37 N. KNOX AVE., CHICAGO 39, ILLINOIS, U. S. A.

Judges in National Machine Tool Builders' Association Advertising Competition (left to right): C. W. Custer, president, American Stamping Co., Euclid, Ohio; S. T. Salvage, advertising manager, Timken Roller Bearing Co., Canton, Ohio; H. I. Orwig, vice president, Buchen Co., Chicago, Ill.; and William Cortwright, vice president and works manager, Warner Gear Division, Borg-Warner Corp., Muncie, Ind.

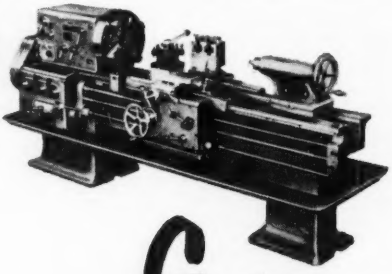
ciation's Spring Meeting which was held recently at the Waldorf in New York City. Forty-eight companies entered at total of 222 advertisements in the competition. The judging of entries was done by William Cortwright, vice president and works manager, Warner Gear Division, Borg-Warner Corp., Muncie, Ind.; C. W. Custer, President, Ameri-

WEISSER HEILBRONN

...always among the best

...has remained the guiding principle and obligation of our firm since the day of its founding.

Re-Orders surpass by far orders from new customers.

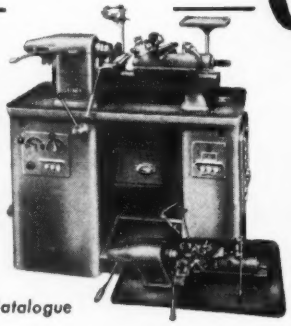


Guthery

MACHINE TOOL CORPORATION

130 WEST 42nd STREET
NEW YORK 36, N. Y.
CHICKERING 4-2820

SINCE 1905 LEINEN



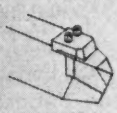
One of the LEINEN Lathes—all of which are designed to meet the most exacting requirements of THE MANUFACTURER OF PRECISION COMPONENTS... THE INSTRUMENT MAKER... and THE TOOLROOM.

Write or Phone for Free Catalogue

HERE'S THE TOOL *that fits to a* "T"

STYLE PTL

STYLE PTR


STYLE PTN

The right angle chucking lathe, tracer controlled, provides for efficient profile machining of workpieces having large diameter, short length, and thin wall sections, particularly those made of stainless steel and heat-resistant alloys.

To complete the set-up, an appropriate cutting tool is required. It must be so shaped as to accurately follow the lead of automatic control, face up to the job, and cut corners with maintained precision.

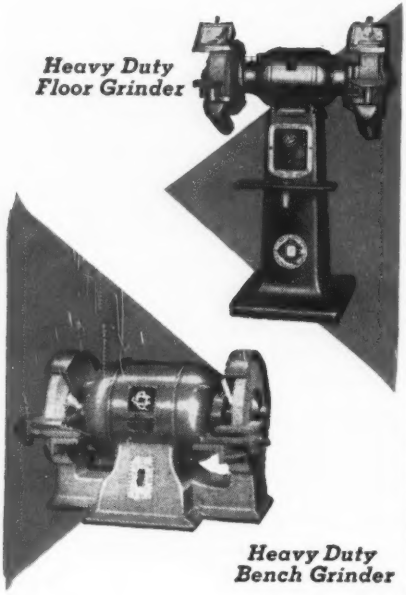
For this very purpose a Kennametal tool has been designed. The mechanically-held triangular insert, seated in a hardened V trough, provides a sturdy design in a 50° nose angle tool that will withstand lateral thrust, and can be modified to smaller nose angles and radii as required by specific profiling conditions.

Four shank sizes are available in three different styles—righthand, lefthand, and neutral, as illustrated in the sketches. See Catalog 52, page 45 for specifications. Confer with our Tool Engineers if you need help in this type of tooling—or any other. Kennametal Inc., Latrobe, Pa.

KENNAMETAL

CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY

"Time Savers in any shop"



Heavy Duty Floor Grinder

Heavy Duty Bench Grinder

Here's extra value in long life, low maintenance and low first cost. QUEEN CITY Bench and Floor Grinders and Buffers have all the quality features . . . ball bearings, heavy duty motors, etc. . . . in a complete range of sizes and models . . . all priced far below comparable grinders and buffers.

QUEEN CITY MACHINE TOOL CO

WRITE TODAY FOR DETAILED LITERATURE

QUEEN CITY MACHINE TOOL CO.

3901 Kellogg Avenue, Cincinnati 2, Ohio

can Stamping Co., Euclid, Ohio; H. I. Orwig, vice president, Buchen Co., Chicago, Ill.; and S. T. Salvage, advertising manager, Timken Roller Bearing Co., Canton, Ohio. Arthur A. Merry, chief advanced tool engineer, Pratt & Whitney Aircraft Corp., East Hartford, Conn., was named a member of the judging panel but was unable to attend because of illness.

There were six categories in the contest. In each category one advertisement was judged the winner and one received honorable mention. The categories and the winning companies are as follows:

Category No. 1—To announce a new machine or model. Winner—Ex-Cell-O Corp., Detroit, Mich. Honorable Mention—Landis Tool Co., Waynesboro, Pa.

Category No. 2—To describe the outstanding features of a machine tool. Winner—Landis Tool Co., Waynesboro, Pa. Honorable Mention—Van Norman Co., Springfield, Mass.

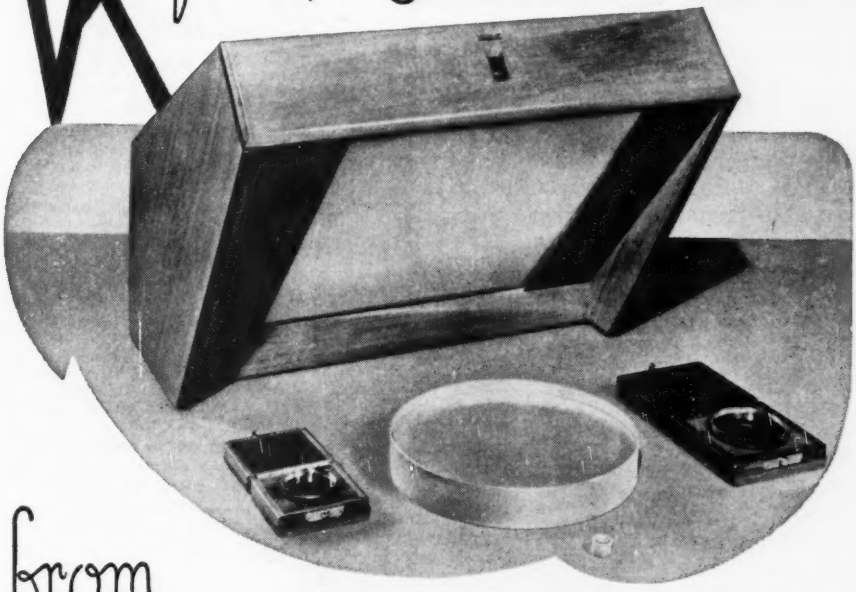
Category No. 3—To acquaint the field with a company's complete line or one section of it. Winner—Monarch Machine Tool Co., Sidney, Ohio. Honorable Mention—Landis Tool Co., Waynesboro, Pa.

Category No. 4—To show a case history or testimonial. Winner—R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. Honorable Mention—National Acme Co., Cleveland, Ohio.

Category No. 5—To build company or industry prestige. Winner—Warner & Swasey Co., Cleveland, Ohio. Honorable Mention—Warner & Swasey Co., Cleveland, Ohio.

Category No. 6—To render a service to the customer by giving information or instruction. Winner—Bryant

VK fused quartz OPTICAL FLATS



from

½" diameter up . . . . accurate to .000001"

With VK Optical Flats, close checking of flat surfaces is simplified and more conveniently handled.

Shown here is the new Van Keuren monochromatic light, 22¼" wide, 17¼" high and 20" deep (in bench space). It is designed for use with large optical flats such as the one shown—a 10" diameter fused quartz double-surface master flat (accurate to .000001" both sides).

VK Optical Flats are available in sizes from ½" diameter to 10" diameter in .000001", .000002" or .000004" accuracy. They can be shipped within 30 days from order.

Catalog and Handbook No. 35 is available by writing: The Van Keuren Co., 175 Waltham St., Watertown, Mass. Ask for your copy.

VK
34th YEAR

THE Van Keuren CO.,

175 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires

model "REC" with detachable micrometer base

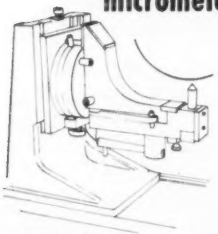
.0001" ACCURACY

Fluidmotion

WHEEL DRESSERS

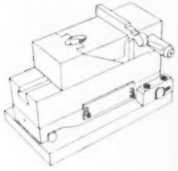
dress two angles tangent to a radius in one continuous motion

High-Carbon, High-Chrome Construction

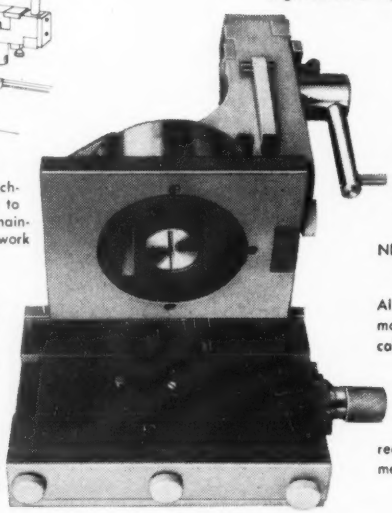


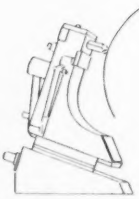
FIXTURE WITH MICROMETER FEED

Under the wheel attachment makes it possible to dress under the wheel, maintaining any desired work height.



Precision Grinding Vise with or without sine bar allows rapid unloading and exact relocating.





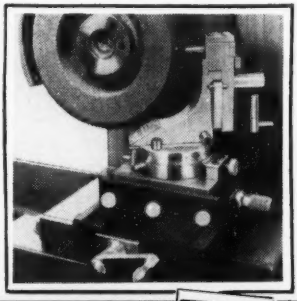
NEW SOLID ANGLE RAMP WITH MICROMETER LEAD SCREW

Allows fixed position of diamond when used in cylindrical grinding for dressing above the center line, but coincidental with the center line of the wheel. Factory will recommend proper equipment on request.

ADAPTABLE TO ALL TYPES OF CYLINDRICAL AND SURFACE GRINDERS

By loosening gib, dresser can be removed from the micrometer "C" Base and affixed to solid or adjustable angle ramp for cylindrical grinding. For surface grinding the dresser is returned to "C" Base.

Photograph on right shows special compound base with micrometer lead screw having travel in four directions. Dresser usually is furnished with extra stops for zero setting.



J & S TOOL CO., INC.

645 W. Mt. Pleasant Ave. Livingston, N. J.
(N. J. Highway Route No. 10)

J&S TOOL CO. INC.

A variety of models and attachments to suit your needs. Write for free catalog covering dressers in detail. J & S also manufactures a complete line of All-Purpose Jaw (machine) Clamps, Vises, and Special Tools. Write for Machine Shop "Time Savers" booklet.

J & S Tool Co., Inc. distributors are located in principal cities

Franklin E. Smith & Assoc., Maywood, Calif., **phone Kimball 0914**
Industrial Service Co., Atlanta, Georgia, **phone RA 1195**
Boyd-Wagner Company, Chicago 7, Ill., **phone Haymarket 1-1200**
The Geo. O. Desautels Co., Indianapolis, Ind., **phone Wabash 2403**
L. D. Supply Co., Wichita, Kansas, **phone 5-9692**
William J. Leppert, Baltimore, Md., **phone Hamilton 3661**
Gale Forssen Co., Springfield, Mass., **phone Springfield 9-1011**
Charles E. Cummiskey & Assoc., Detroit 24, Mich., **phone Tuxedo 5-6635**
Forcey Machine Tool Sales, St. Paul, Minnesota, **phone Prior 1822**
H. O. Monahan Co., St. Louis, Mo., **phone Sterling 6574**
Galvin Machinery Sales, Buffalo, N. Y., **phone Grant 4341**
Syracuse Supply Co., Syracuse, N. Y., **phone Syracuse 2-9231**
Peter O. Boylan, Cincinnati, Ohio, **phone Valley 3997**
Garco Machinery Co., Cleveland 17, Ohio, **phone Kenmore 1-9120**
The Monnier Tool & Supply Co., Dayton, Ohio, **phone MI-4717**
Geo. E. Zweifel & Co., Portland, Oregon, **phone Beacon 1412**
Gilling Engineering Co., Pittsburgh 33, Pa., **phone Allegheny 1-1420**
C. G. Wilson Co., Dallas, Texas
The Lang Co., Inc., Salt Lake City 9, Utah
Ed Schuerer Sales, Milwaukee 13, Wisc., **phone GL 3-2960**
Lemuel R. Lance, Inc., Philadelphia 40, Penna., **phone Davenport 4-0700**
Saginaw Supply Co., Saginaw, Michigan, **phone 5-3447**
Sam K. Stone, Ft. Smith, Arkansas, **phone 2-1221**
Joseph C. Fletcher, San Francisco, Calif., **phone Underhill 1-2991**
J. H. Ryder Machinery Co., Toronto 5, Ont., Can. **phone Princess 6611**
L. C. Thatcher, Seattle, Wash., **phone Seneca 4948**
Joseph Monahan Co., Grand Rapids 4, Mich., **phone 8-5917**
Wright Industrial Supply Co., Toledo 12, Ohio, **phone Kingswood 5752**
P. M. Company, New York, N. Y., **phone Canal 6-7140**

Chucking Grinder Co., Springfield, Vt. Honorable Mention—Gardner Machine Co., Beloit, Wis.

Michigan Tool Forms Industrial Chemicals Division

Michigan Tool Co., Detroit, Mich., has announced the formation of a separate division to manufacture and market a line of industrial chemical products which the company has been developing for the past several years. The new division will be known as the Shear-Speed Chemical Products Division, the headquarters and sales offices of which will be located at 7125 E. McNichols Rd., Detroit 12, Mich. A factory building has been acquired and the installation of equipment has begun.

Announcement of the various products to be marketed by the Shear-Speed Chemical Products Division will be made as rapidly as production facilities are placed in operation. Larry A. Bard has been named manager of the new division by Marvin R. Anderson, executive vice president of Michigan Tool Company.

Montreal Tool and Equipment Show

The fourth Montreal Tool and Equipment Show, sponsored by the Foremen's Club of Montreal with the cooperation of other industrial organizations, will be held in the Exhibition Building, Show Mart, Montreal, November 9th to 13th, 1953. An attendance of some 25,000 top management and production executives from industrial plants in Canada is expected. Total floor space to be occupied is

80,000 square feet on two floors. United States manufacturers are invited to participate in order to stimulate sales through distributors or to obtain distribution.

Combined with the show is the Montreal Materials Handling Show. Exhibition offices under the names of both shows are located at 4585 Sherbrooke St., W., Montreal, Quebec, and 19 Melinda St., Toronto, Ontario.

Parker Appliance Purchases Sundstrand Hydraulic Accessory Line

The Parker Appliance Co., Cleveland, Ohio, has purchased, in its entirety, the JIC line of hydraulic accessories for machine tools formerly made and in process of development by the Hydraulic Division of Sundstrand Machine Tool Co., Rockford, Ill., S. B. Taylor, president of Parker Appliance, stated that Parker is acquiring all the pumps and valves and special hydraulic units formerly built by Sundstrand for application to machine tools, and these products will be augmented with additional developments already underway in Parker's Industrial Hydraulics Division in Cleveland. Parker Appliance already manufactures hydraulic accessories for aircraft and for mobile equipment used in materials handling, in road building, etc.

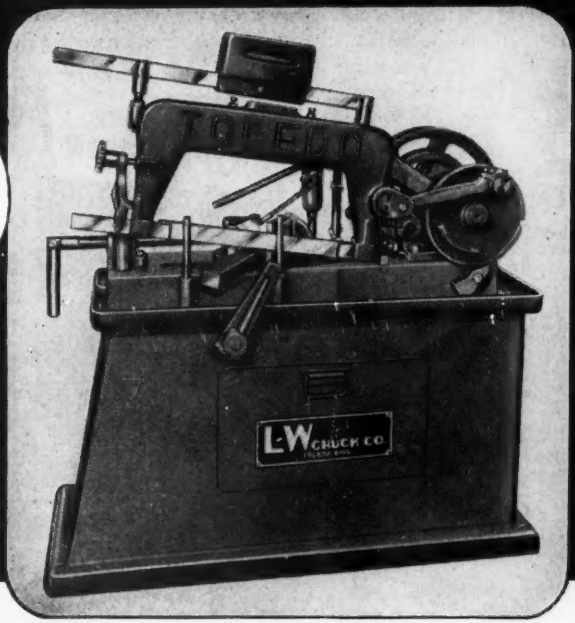
The purchase, it is claimed, will not affect Sundstrand's production of hydraulic products for other uses nor its production of oil burner fuel units.

DRILL HEADS
Expertly Designed
to Fit YOUR Needs For...
DRILLING • TAPPING •
SPOTFACING • REAMING •
BORING
US
Fixed Center Oil Circulating Spindle Head with Vertical Adjustment Spindles. Designed mainly for high speeds.
Standard Fixed Center Construction. Bushed Guide Rod Holes and Lifter Rod Holes with Vertical Adjustment Spindles.
We manufacture, at lowest possible price, all types of multiple spindle fixed center adjustable and lead screw tapping heads.
US HEADS
SINCE 1915
Close Fixed Center Multiple Head with Suspended Bushing Plate.
UNITED STATES DRILL HEAD CO. • CINCINNATI 4, OHIO

Everything You Want in a Good High Speed Saw at an Ever-So-Low Price!

LW POWER HACK SAWS

ONLY $297.56



Stops automatically on completion of cut. Automatic relief of saw blade on non-cutting stroke. 6" x 6" capacity using 10" x 14" blades. 12" x 3" clutch pulley. Pulley speed 120 r.p.m. Coolant pump base. Swivel vise for angle cuts. All steel welded base and table. V-belt drive. Rigid frame. Gravity feed. Length gauge. Expanding clutch.

3-speed (90 to 130 r.p.m.) V-belt motor drive arrangement, $32.21, less motors ½ H.P. 1725 r.p.m. motor recommended. Completely Motorized with Switch; Single Phase $390.24; Three Phase $397.03.

Order from your industrial supply distributor or order direct, giving name of your distributor.

IMMEDIATE DELIVERY

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products

L-W CHUCK COMPANY 28 SO. ST. CLAIR ST. TOLEDO 4, OHIO

Metal-Working News in Brief

The Lees-Bradner Co., Cleveland, Ohio, manufacturer of precision thread milling machines and hobbing machines, and distributor of the Cri-Dan high-speed threading machines, has announced the appointment of **Charles Ross Co.,** Rockford, Ill., as sales representative in the Chicago area, covering Iowa, Illinois, and Wisconsin.

Kurt Orban Co., New York 17, N. Y., has announced the appointment of **Karl Goetz** as manager of the San Francisco branch with offices at 3036 Telegraph Ave., Berkeley, Calif. The company has also announced the opening of a Miami branch office at 1816 20th St., Miami Beach, Florida. **Arthur Nichols,** formerly manager of the company's Boston office, will be in charge of the new office.

— o —

Robert E. Nixon has joined Adamas Carbide Corp., Harrison, N. J., as service engineer. Mr. Nixon was formerly in charge of carbide engineering and the carbide trouble-shooting section at Union Twist Drill Co., Athol, Massachusetts.

— o —

Kennametal Inc., Latrobe, Pa., has announced the appointment of **Richard H. Oberholtzer** as manager of its Milwaukee district with headquarters at 744 N. Fourth St., Milwaukee, Wis. Mr. Oberholtzer succeeds **Carl Wheelock** who has resigned after 16 years with the company.

16 HOLES -- THREE PRESSES — ONE OPERATOR!

FITS ON ANY DRILL PRESS

3 QUADRILLS ON 3 PRESSES DO WORK OF 16 SPINDLES AT RING MFG. CO.

QUADRILL

4-POSITION Instantly Adjustable tool drills, taps, reams, countersinks, counterbores — all on 1 drill press with 1 operator. Does work of 4 presses. Costs less than 1 press.

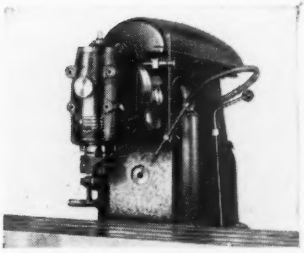
QUADRILL produces more holes faster—No time loss—Cuts production costs 33%.

Investigate this important time and work saver. *Write for Catalog Today*

CHICAGO QUADRILL CO.

1844 BUSSE HIGHWAY, DESPLAINES, ILLINOIS

Swedish Craftsmanship!



Sajo Vertical Milling Attachment

The Sajo "Plain" Milling Machine

the SAJO "UNIVERSAL" MILLING MACHINE

exemplifies the expert workmanship that is traditional in Swedish machine tools. Like all SAJO Millers, this new Universal Milling Machine was designed and built to the highest standards of quality and practical utility.

Avoidance of exterior "luxury" features, slight in value but substantial in cost, and concentration on the vital factors of construction, enable the SAJO to deliver top performance at moderate cost.

SAJO Millers are available in Plain and Universal types, with longitudinal power table feed only, or with power feed in all directions. Screws and dials are in the U. S. inch system.

★ **Standard Equipment includes:** 3 HP motor and starter equipment, motor driven coolant system, adjustable table feed nut to allow climb milling, 1" arbor, arbor support brace.

★ **Extra Equipment:** Universal Dividing Head, Vertical Milling Attachment, Slotting Attachment, Swivel Base Vise, Rotary Table.

CONDENSED SPECIFICATIONS

Table Size	41½" x 9¼"
Longitudinal travel: Plain Miller	24½"
Universal Miller	27½"
Transverse travel	8¼"
Vertical travel	19"
12 spindle speeds	36-1540 RPM
Table feeds	12
Taper in spindle	No. 40 NMT
Main motor	3 HP

Precision anti-friction bearings on spindle and gear shafts
One-piece column and base
Net weight—2200 lbs.

Write for Catalog

NO PRIORITY—— PROMPT DELIVERY——ATTRACTIVE PRICE

AUSTIN INDUSTRIAL CORP. 76-H MAMARONECK AVE. WHITE PLAINS, N. Y.
DEALERS IN PRINCIPAL CITIES

Metal-Working News in Brief

Greenlee Bros. & Co., Rockford, Ill., has announced the retirement of **Judson H. Mansfield,** chief engineer, after 47 years of service. Mr. Mansfield has been succeeded by **Joel A. Jannenga,** who has been with the company since 1949. Mr. Mansfield is being retained as an engineering consultant by Greenlee.

Raybestos-Manhattan, Inc., has moved from 445 Lake Shore Drive into its newly constructed Chicago office and warehouse building at 6010 Northwest Highway. The new building is said to provide greatly expanded facilities for warehousing mechanical rubber, packings and asbestos textiles and for Chicago sales offices, as well as national sales headquarters for the Equipment Sales Division.

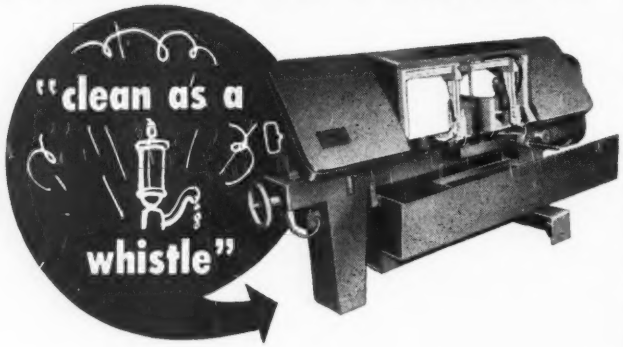
— o —

Rivett Lathe & Grinder, Inc., Boston, Mass., has announced the appointment of **Lane Engineering Co.** 1807 Elmwood Ave., Buffalo 7, N. Y., as representative in the Buffalo area for the Rivett line of air and hydraulic valves, cylinders, and power units.

— o —

The Pannier Corp., Pittsburgh 12, Pa., has announced the appointment of **Edward L. Miller** as sales manager, **Edwin L. Voll** as assistant sales manager, and **Reiferd G. Phillips** as assistant to the sales manager. James L. Snaman is no longer with the company.

NOW...CUT METAL



That's right. There's no burr and kerf is held to a bare minimum when cutting with a Kalamazoo Metal Cutting Band Saw! What's more, accuracy of a few thousandths can be maintained in cutting bars, rounds, angles and odd shapes.

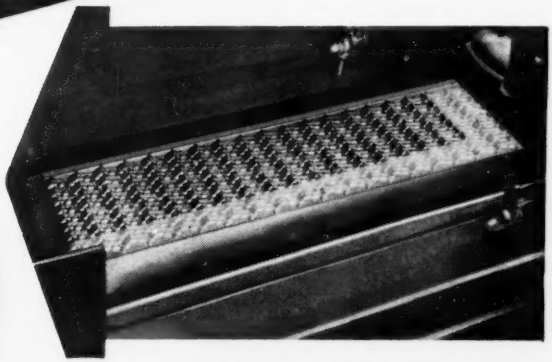
Remember, for continuous or intermittent production cutting at *lowest cost . . . a Kalamazoo can't be beat!* Three sizes are available, all can be had with casters for complete portability. Before you specify any metal cutting band saw . . . investigate what Kalamazoo offers!

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO CO.

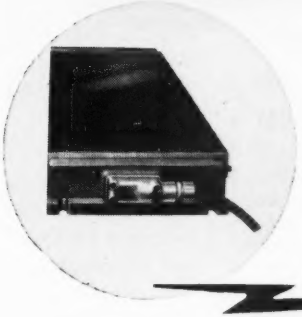
510 HARRISON ST., KALAMAZOO, MICHIGAN

40% MORE HOLDING AREA



...another reason why SUNDSTRAND Magnetic Chucks are more efficient

Here's an interesting study of why many manufacturers are now using the new multiple pole Power-Grip Chuck to increase grinding production. Installation of a new Power-Grip Chuck provided 40% more holding area than was possible with the equipment of the same size formerly used. In the illustration above the lightened area shows the increase in the work holding capacity of the Sundstrand Chuck.



The illustration to the left shows the closely spaced pole separations which are of .050" wide brass separated by a ⅛" wide mild steel spacer. This design feature coupled with the unusual efficiency of Sundstrand low voltage winding gives uniform holding power over the entire face of the chuck.

Free Data

Write for new magnetic chuck bulletin — contains useful information on this and other Power-Grip Chucks. Ask for bulletin 531-M.

SUNDSTRAND POWER-GRIP

SUNDSTRAND
Magnetic Products Co.
Division of Sundstrand Machine Tool Co.
1020-9th ST. • ROCKFORD, ILLINOIS

Metal-Working News in Brief

The Delta Power Tool Division, Rockwell Mfg. Co., Pittsburgh, Pa., has announced the appointment of **Otto Schmidt** as midwestern drill unit sales representative. In his new capacity, Mr. Schmidt will specialize in drilling and tapping problems. He will make his headquarters at 817 Forest Rd., La Grange Park, Illinois.

The Society for Experimental Stress Analysis, P. O. Box 168, Central Square Station, Cambridge 39, Mass., has announced that the 1953 Spring Meeting of the society will be held at the Hotel Schroeder, Milwaukee, Wisconsin, on May 20, 21, and 22.

— o —

The appointment of **Economy Equipment Co.,** St. Louis, Mo., as agent for the sale of standard industrial equipment in the states of Missouri and Kansas and the southern half of Illinois has been announced by Surface Combustion Corp., Toledo, Ohio. Economy Equipment has sales and technical service offices in Kansas City and Wichita, Kansas, and in St. Louis.

— o —

Lavallee & Ide, Inc., Chicopee, Mass., has announced that **C. A. Pafenbach & Company** has replaced Western Drill & Tool Supply Company as west coast agent for its line of reamers. C. A. Pafenbach & Company has opened new quarters at 327 S. 6th St., Los Angeles.

CHAMPION
E-X-P-A-N-D-I-N-G
MANDRELS

Precision Model

Standard Model

give *speed* to every set-up

The flexible sleeve, mounted on tapered arbor, expands automatically to fit the hole. Inserted by hand — no arbor press needed. Always an exact, positive, concentric fit. Locked by a single mallet blow. Unlocked the same way. CHAMPION Expanding Mandrels are used in machine shops around the world. Save time, cut production costs, whether the job calls for machining one piece or a thousand.

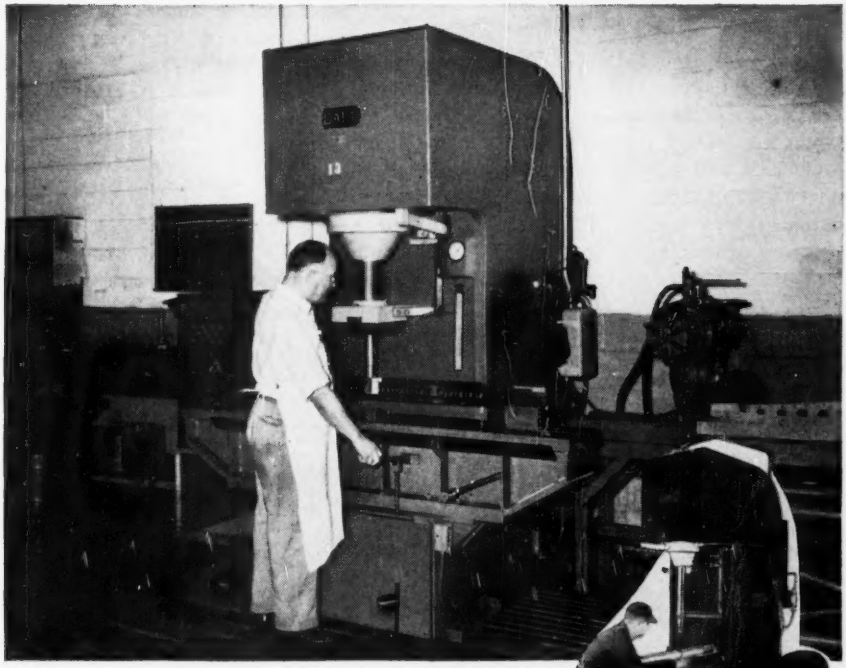
Precision Model has expansion range of .010". Available in regular sizes to fit holes from ½" to 3" diam. Holds work to tolerances of .0002" run-out. Guaranteed for precision grinding, turning and milling operations.

Standard Model maintains close tolerances, handles material of any length bore, hard or soft metals — from thin tubes and bushings to heavy castings and forgings. A set of fourteen will fit every hole from ½" to 9½" diam.

CHAMPION *Expanding Mandrels can be made in special shapes and sizes to fit any specifications. Quotations on request. Write for descriptive folder today.*

WESTERN TOOL & MFG. CO., INC.

Dept. 28 **Springfield, Ohio**



How to Straighten Flap Tracks

Precision parts for aircraft call for the use of precision equipment.

These flap tracks, machined from 4130 steel (aircraft quality), must be checked on a straightening press four times during fabrication. For ease of control and accuracy, the work is done on Dake Gap Type Presses like that shown in the photograph above.

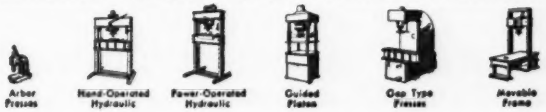
To the right of the ram, the operator has placed a rule gauge which indicates ram travel. Knowing the elasticity of the piece being tested, he can estimate the overtravel necessary to straighten the piece with a single movement of the ram.

Dake Gap Type Press broaches boring bars

Dake Gap Type Presses are available for straightening or forcing, in 22 models ranging up to 300 tons capacity. They are fully described in Bulletin No. 299—sent on request.

Dake Engine Company, 612 Seventh St., Grand Haven, Mich.

DAKE PRESSES



Metal-Working News in Brief

Bausch & Lomb Optical Co., Rochester 2, N. Y., has announced the promotion of **John D. Harby** to assistant superintendent of its Eyeglass Frame Division. **Charles N. Hendershott,** formerly factory engineer, has been assigned to succeed Mr. Harby as head of factory engineering, inspection, and tool design in the firm's Scientific Instrument Division.

Myron S. Curtis, former director of engineering, has been elected engineering vice president of the Warner & Swasey Co., Cleveland, Ohio. Mr. Curtis has been associated with the company since 1940.

— o —

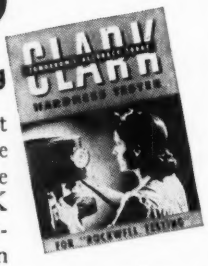
The Cross Company, Detroit manufacturer of machine tools, has announced the appointment of **William Philip Gallant** as director of human relations. Mr. Gallant was formerly a management consultant with Walter V. Clarke Associates located in Barrington, Rhode Island.

— o —

The G. A. Gray Co., Cincinnati, Ohio, has announced the appointment of **Harrington Wilson Brown Co.,** New York, N. Y., as representative for the sale of its complete line of planers, planer-type milling machines, and horizontal boring, drilling, and milling machines, in eastern New York State, southern Connecticut, northern New Jersey, and the northeastern counties of the State of Pennsylvania.

GET THE FACTS

About Hardness Testing

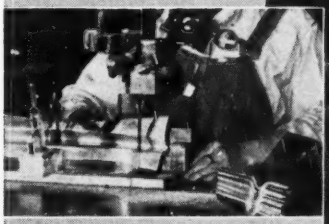


Everything you need to know about hardness testing is told in this handsome book, prepared by the makers of the internationally respected CLARK Hardness Testers for "Rockwell Testing." Simple, easy-to-read text (in English) and numerous illustrations show the equipment and procedure for fast, accurate hardness testing of ferrous and non-ferrous materials. If you would like a copy, *free of charge*, just attach this ad to your letterhead or write "Send book." A copy will be mailed to you promptly.

P.S. If you are interested in descriptions and prices for CLARK Hardness Testers (Standard and Superficial) of *guaranteed accuracy*, say the word and we'll gladly supply them.

CLARK INSTRUMENT INC.
10204 Ford Road • Dearborn, Mich., U.S.A.

NOTHING
COMPARES
WITH IT FOR
TRIMMING
FORMED
PARTS!



FRICTION
SAWING with

Tannewitz HIGH SPEED
BAND SAWS

Tremendous savings of time and money are effected in trimming formed parts with Tannewitz High Speed Band Saws, for not only are the cuts made fast and smoothly, but in most cases no jigs or rests of any kind are required. Sheets of both soft and hard steel, non-ferrous metals and many other materials are also handled to great advantage by this method and it is perfect for trimming castings. By all means get the complete facts and learn of the many opportunities for boosting production and lowering costs that Friction Sawing with Tannewitz High Speed Band Saws offers.

The TANNEWITZ WORKS GRAND RAPIDS MICHIGAN

WRITE FOR FREE COPY OF FRICTION SAWING

Metal-Working News in Brief

The Hy-Pro Tool Co., New Bedford, Mass., has announced the appointment of **Francis T. Thorley** as eastern district manager, **Harry B. Hubbard** as direct factory representative in Connecticut, and **Earl C. Jex, Jr.,** as direct representative in Michigan. Mr. Jex will operate out of the company's Detroit office, and Mr. Hubbard will work out of his home in Kensington, Connecticut.

— o —

Hanna Engineering Works, Chicago, Ill., manufacturer of hydraulic and pneumatic cylinders, valves, and riveters, has announced the appointment of **Barton Sales Co.,** 1609 W. Third St., Ft. Wayne, Ind., as sales representative in northern Indiana including the cities of Ft. Wayne and South Bend. The northern Indiana territory was formerly serviced by Hanna's Chicago sales office.

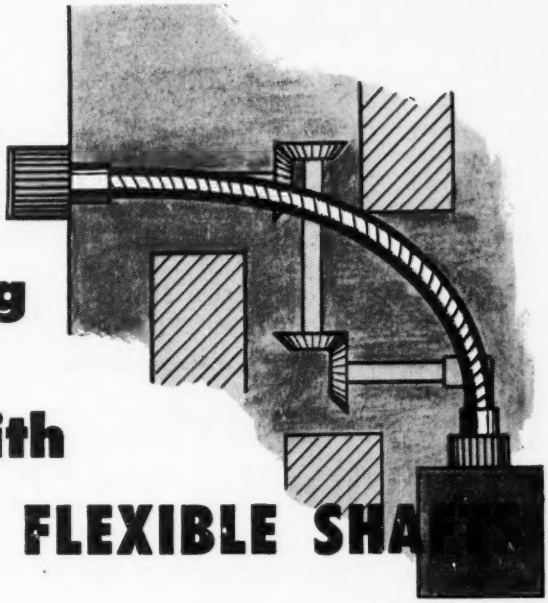
— o —

The Ohio Crankshaft Company has announced the appointment of **Chester H. Kimmel** to the post of vice president and general manager. Mr. Kimmel has been with the company since 1940.

— o —

George C. Howe, formerly general sales manager of The Felters Co., Boston, Mass., has been named a vice president of the firm but will continue to be in charge of sales.

CUT THE COST OF controlling machine parts...with S.S.WHITE FLEXIBLE SHA



Look at the simplicity of the flexible shaft control shown above and compare it with the combination of rods, bevel gears and supports that would otherwise have to be used. The savings in parts is obvious. What's more, the flexible shaft is less complicated—needs no alignment—and is easily installed. **The net result is substantial savings in manufacturing and assembly costs.**

S.S.White engineers will be glad to cooperate with you in selecting and applying flexible shafts to your needs. Call them in today —there's no obligation.

SEND FOR THIS 256-PAGE FLEXIBLE SHAFT HANDBOOK

It has full details on flexible shaft selection and application. Write for it direct to us on your letterhead.

THE S.S.White INDUSTRIAL DIVISION
DENTAL MFG. CO.

Dept. 5, 10 East 40th St.
NEW YORK 16, N. Y.

WESTERN DISTRICT OFFICE • TIMES BUILDING • LONG BEACH, CALIFORNIA

Metal-Working News in Brief

Miller Motor Co., Melrose Park, Ill., has announced the appointment of **H. Bruce Rasmussen** as sales manager in charge of the company's coast-to-coast sales organization. Mr. Rasmussen was formerly associated with Baker Chemical Company. Miller Motor also announced the appointment of **Jack Frink, John Vaas, Stephen Stiles,** and **Roger Lawson** as factory salesmen. Mr. Frink and Mr. Vass will cover the Chicago area, Mr. Stiles will be in the Detroit area, and Mr. Lawson will work in the Cleveland-Akron-Youngstown area.

— o —

Walter J. Holder has been appointed assistant to the general sales manager at Honan-Crane's home office in Lebanon, Ind. Mr. Holder formerly served as resident engineer for the company in the central New York area.

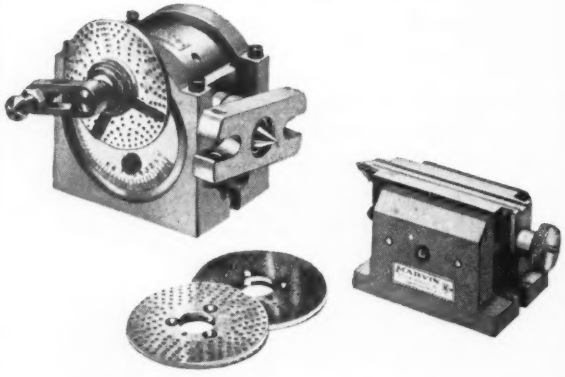
— o —

British Industries Corp., New York, N. Y., has announced the appointment of **C. O. Helphenstine** as district manager in the Detroit area. Mr. Helphenstine will make his headquarters at the company's Detroit office.

— o —

Homestrand, Inc., Larchmont, N. Y., has announced the appointment of **Empire Tooling Association,** 148 S. Woodward Ave., Birmingham, Mich., as exclusive representative in Michigan for its line of Metron height gages, vernier calipers, and Vipp dial indicators.

MARVIN
DIVIDING HEAD
SMALL — ACCURATE — RUGGED



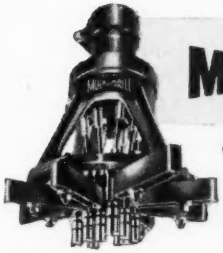
CATALOG WITH COMPLETE SPECIFICATIONS
YOURS FOR THE ASKING

MARVIN Machine Products Inc.
414 FORD BUILDING • DETROIT 26, MICHIGAN

Commander PRODUCTION TOOLS

SPEED PRODUCTION...

LOWER COSTS



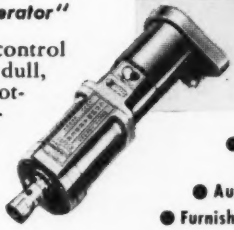
Adjustable MULTI-DRILL

- Adjustable To Any Hole Pattern
- Drill 2 to 8 Holes at 1 Stroke
- Fits Any Drill Press

Increase production up to 800%—save time, cut costs. Mounted without alterations or special tools. 9" drilling area; centers to ½". Extension Spindles available to increase area to 22½". Special adaptations available.

"The tapper that thinks for its operator"

Adjustable full range torque control instantly stops any tap when it's dull, loaded, strikes a hard spot, or bottoms in blind hole tapping. Assures maximum production, cuts rejects, even with inexperienced operators.



Commander TAPPER

- Wider Range . . . 1 Tapper Handles No. 0 to ¾" Taps
- Automatic Tap Protection
- Furnished to Fit Any Drill Press

DRILL CHIP BREAKER

- Drill SHALLOW or DEEP Holes up to 400% Faster
- Drill 10 diameters or more in depth without clearing drill
- Better, Smoother, More Accurate Holes

Ordinary Chips

Chip Breaker Chips

Write FOR CATALOG
and the name of your nearby Commander Distributor

Commander MFG. CO.
4219 W. KINZIE STREET • CHICAGO 24, ILLINOIS

Metal-Working News in Brief

The opening of new offices and plant by **Master Chemical Corporation** was announced recently by C. A. Sluhan, president, at a dinner and inspection tour held at the new plant. Master Chemical, manufacturer of a water soluble coolant for machine tools, is now located at 13 Huron St., Toledo, Ohio.

Kennametal Inc., Latrobe, Pa., has announced the appointment of **Leonard Arnold** as a representative in the Syracuse area; **James Denial** as a representative in Elmira; **Kenneth Hoffman** as a service engineer in the Chicago area; **Andrew Horvath** as a service representative in the Middle Atlantic states; **Robert Schwing** as a service engineer in the Middle Atlantic states; **George R. Sundell** as a service engineer in the Pittsburgh area; and **Carl E. Widen** as a service engineer in the Chicago area. In addition, Kennametal Incorporated has also announced the appointment of the following export representatives: **L. D. Seymour & Co.**, 120 Wall St., New York City, for Japan; **Koopman & Co.**, N. V. Stadhouderskade 6, Amsterdam, The Netherlands, for Indonesia; **Materiels & Materiaux De Constructions S. A.** 1-2, Route De L'Etoile, Elisabethville, for Belgian Congo; and **Cia Mexicana De Electricidad, S. A.**, Zaragoza Nte. 652, Monterrey, N. L., for the northern part of Mexico.

De-Sta-Co Toggle Clamps are extremely flexible in their application and are economically and easily adapted to work-holding fixtures for assembly, welding, bonding, machining or other production processes. Smooth, fast, powerful clamping action clamps parts quickly . . . holds them firmly in perfect alignment . . . releases instantly for easy removal and insertion of new workpiece.

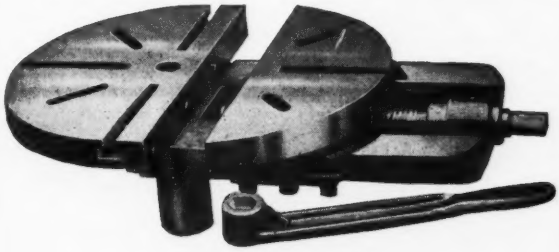
De-Sta-Co clamps are engineered for rugged use in production; reamed bearing holes insure precision fit, long life and sensitive operation . . . offsets in handles and links relieve friction . . . made with cold drawn bars, and forged portable clamp parts. Accessories for adapting clamps to specific applications are available.

Write today for name of nearest distributor and your copy of the De-Sta-Co catalog which describes over 40 fixture and portable models with positive holding pressures up to 4000 pounds.

DESTACO **DETROIT STAMPING COMPANY**

349 MIDLAND AVE. • DETROIT 3, MICH.

Try the MODERN SAFETY DRILL TABLE



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FREE TRIAL OFFER

For Faster, SAFER Work in Your Maintenance Department

Combines a drill table, a vise, a set of parallels and V block. No more lost fingers, from hand held jobs that slip. No more 30 minutes set-ups for a 1 minute drilling operation. Made in 6 sizes, from 8" to 28" dia. We guarantee each Safety Drill Table will save its cost on labor alone in 6 months, to say nothing of plant down time when vital maintenance is delayed even a few minutes.

WRITE FOR FREE FOLDER

Shows many typical set-ups, and use on radial drills. Complete specifications on all models. Covers MONEY BACK GUARANTEE and 30 DAY FREE TRIAL OFFER.

MODERN MACHINE TOOL CO.
Jackson, Michigan

Metal-Working News in Brief

Les A. Shea, general sales manager of Lindberg Engineering Co., Chicago, Ill., has returned to the company after eight months in Washington as industrial representative in N. P. A. Mr. Shea has been designated to head the expansion plans and moving of Lindberg's Air & Hydraulic Division to a new location.

Lt. Col. Peter J. Jensen, manager of the Michigan sales district for Carboloy Department of General Electric Co., Detroit, Mich., when he was recalled to extended active duty with the Ordnance Corps, has returned to his former position. **Vernon H. Dearle,** who has been serving as manager of the Michigan sales district, will voluntarily retire after 24 years of service with the organization.

—o—

The New York City domestic sales offices of the **Abrasive Division, Grinding Machine Division,** and **Refractories Division** of **Norton Co.,** Worcester, Mass., have moved from 61 Broadway, New York City, to Green and North St., Teterboro, N. J. Their new headquarters at the Behr-Manning warehouse and office at Teterboro have been established to improve service to customers in the New York industrial area. The office of Norton Behr-Manning Overseas Inc., will remain at 61 Broadway, New York 6, New York.

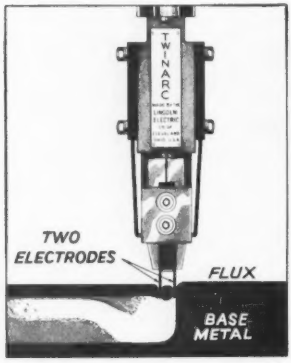


Fig. 1. New Lincoln "TWINARC"... feeds two continuous electrodes simultaneously for faster welding.

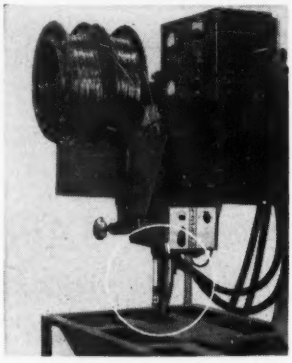


Fig. 2. Automatic Lincolnweld LAF-2 with new "TWINARC" attachment. "TWINARC" replaces original single electrode jaws. Operates with same single controls.

INCREASES WELDING SPEEDS 50% AND HIGHER! TO CUT YOUR COSTS

IT is now possible to realize savings up to 35% in the cost of automatic welding with Lincoln's new "TWINARC". Welds have deeper penetration, greater uniformity . . . and are produced at *speeds 50% higher* than possible with single electrode automatic welding.

Reports from code welding fabricators indicate quality superior to conventional automatic processes.

With "TWINARC", welding currents up to 1200 amps are concentrated on two small diameter electrodes (Fig. 1). These electrodes can be set in line with the work for tandem welding to attain maximum penetration at high speed. For welding thin material or assemblies with poor fitup the "TWINARC" head may be rotated in any position to 90 degrees across the joint to spread the arc, reducing the danger of burning through.

"TWINARC" welding is only one of many new Lincoln developments designed to cut your costs. Have your representative survey your needs and recommend latest Lincoln techniques to speed welding, to simplify your operations and save money.

THE LINCOLN ELECTRIC COMPANY
Dept. 3502, CLEVELAND 17, OHIO
The World's Largest Manufacturer of Arc Welding Equipment

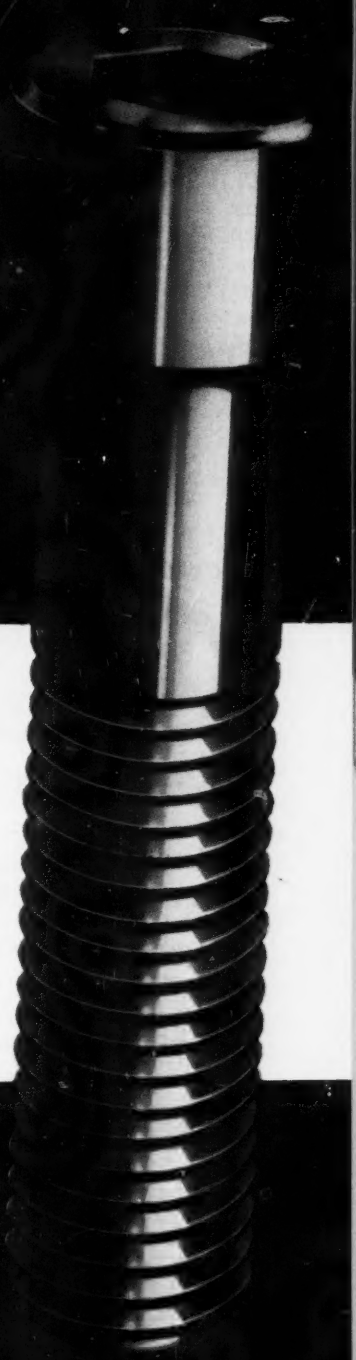
EXTRA *inventory*

EXTRA *men*

EXTRA *service*

at no extra cost . . .

YOUR B-RIGHT-ON SOCKET SCREW DEALER



Sure, you expect delivery and service from your industrial distributor, but you will find there's something EXTRA about the service from your Brighton Socket Screw Distributor—an extra interest in your fastener needs, extra desire and ability to fill those needs.

EXTRA INVENTORY—When you need socket screws, he has them or will get them quickly from centrally located factory stocks.

EXTRA SERVICE—When you need technical help on fasteners, he has at his disposal factory engineers, Brighton's field men, to help you.

EXTRA QUALITY—His line of Brighton Socket Screws is tops in quality, meeting the highest standards of strength, accuracy and uniformity.

Take advantage of all the EXTRAS your Brighton distributor offers. If you are not already acquainted, write for his name.

B-RIGHT-ON

THE BRIGHTON SCREW & MANUFACTURING COMPANY
Reading Road at Dorchester, Cincinnati 2, Ohio

Metal-Working News in Brief

Norton Co., Worcester, Mass., has announced the appointment of **William C. Davidson** as abrasive engineer for the West Virginia territory. Mr. Davidson was formerly instructor of human relations in Norton's sales training department. He was also a grinding engineer in the precision grinding section of the company's sales engineering department.

Firth Sterling Inc., tool and specialty steel producer, and **A. Milne & Co.**, nationwide distributor of solid and hollow tool steels, have combined their operations in the State of Ohio to provide improved service to the retail tool steel trade in that area. Stocks of both Firth Sterling's and Milne's brands of steel will be distributed from A. Milne & Company warehouses located at 11110 Avon Ave., Cleveland, Ohio; 20 S. Charter St., Dayton, Ohio; and 1000 Constance St., Pittsburgh, Pa. Firth Sterling business in other than retail tool steel will be handled as heretofore through its branch offices at 1424 E. 25th St., N. E., Cleveland, and 137 N. Main St., Dayton.

—o—

Albert B. Diss, former vice president in charge of manufacturing, has been appointed vice president and general manager of The Watson-Stillman Co., Division of H. K. Porter Co., Inc., Roselle, N. J. In his new position, Mr. Diss will be in complete charge of all manufacturing and sales operations.

RELY ON Morton FIXTURE CLAMPS and COMPONENTS
BACKED BY 30 YEARS OF FINE TOOL MAKING
● Immediate Delivery on STANDARDS!
Standards can be modified to suit your application.
Largest assortment in the Industry . . . Highest quality of workmanship and materials maintained. Save time, labor, tool and design costs with MORTON.
Morton
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Write Today
For Instructive, Illustrated Catalog containing full size tracing templates of each product.
MORTON MACHINE WORKS
2421 WOLCOTT ST. • DETROIT 20, MICH.

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AUTOMATIC UNITS

for Drilling • Tapping • Reaming • Hollow Milling and Deep Hole Drilling

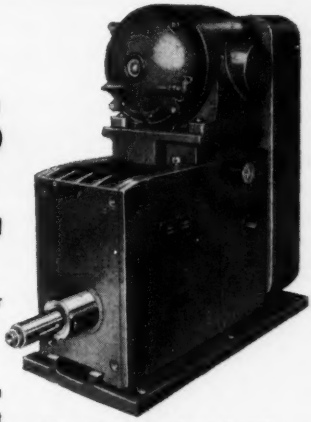
Vertical, Horizontal or Angular Mounting

Units are universal in application . . . let us show you their application to your job.

Made in two sizes—No. 1 and No. 2 Morse Taper.

This simple unit gives high production at a lower cost. When used in multiples to complete operations, no relocation of part is necessary, thus producing more accurate work.

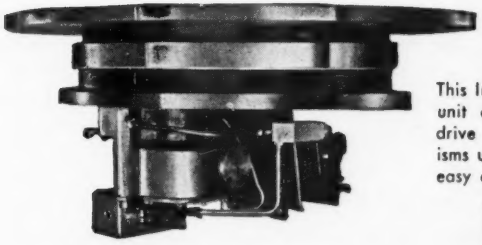
Semi-skilled operators will deliver high production accurately and efficiently, yet with a minimum of supervision.



Here is a packaged unit that will simplify your **HIGH PRODUCTION PROBLEMS**

AUTOMATIC INDEX TABLE

Meets Demand For Drilling and Tapping Equipment



Made in sizes 16", 20", 24", 30", and 36" diameter. Indexes, 3 to 12 stations.

This Index Table is a self-contained unit, built on unit construction principle and includes motor drive assemblies. All drive and control mechanisms underneath table for free work surface . . . easy accessibility.

Consult the yellow pages in your phone book —under Machine Tools—for our nearest representative, or write direct to our factory.

THE Avey DRILLING MACHINE CO.
Cincinnati 1, Ohio

Metal-Working News in Brief

G. M. Stickell has been appointed to serve as general manager of Landis Machine Co., Waynesboro, Pa. Mr. Stickell has been vice president of the company since 1942 and will continue in that capacity along with his new duties. Mr. Stickell succeeds **J. H. Elliott** as general manager. Mr. Elliott, who formerly served as president and general manager, will continue to serve as president of the firm.

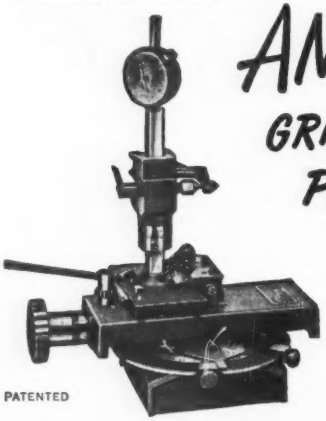
Lovejoy Tool Co., Springfield, Vt., has announced the election of **Gerry T. Attridge** as vice president. Mr. Attridge, formerly general manager, has been associated with the company since 1946.

— o —

Homer L. Lacock & Associates, sales representative for Detroit Stamping Co., Detroit, Mich., manufacturer of specialized pressed metal parts, has announced the appointment of **William F. Monahan** as representative in the central New York territory. Mr. Monahan will make his headquarters at 468 Monroe Ave., Rochester 2, New York.

— o —

Norman S. Wright & Company, west coast representative and distributor of "De-Sta-Co" toggle clamps, has established an office with warehouse facilities at 112 W. Jackson St., Phoenix, Arizona. The new facilities, under the direction of **Robert Langmade,** will enable the company to provide more efficient service to the southwestern industrial area.

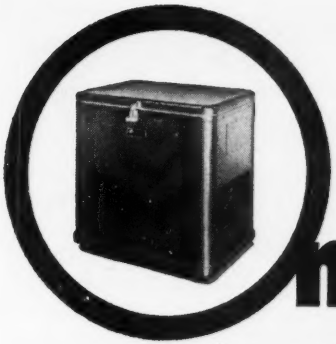


ANOTHER GRINDING ROOM PROBLEM SOLVED!

PATENTED

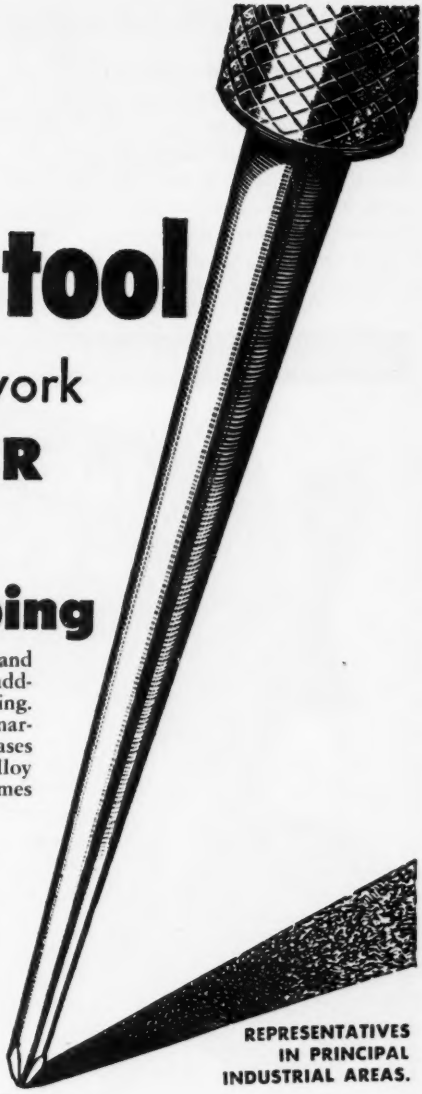
The small, precision-built machine you see above is the Radi-Form, a grinder attachment, that does almost everything but talk. The Radi-Form can move the work in a predetermined arc of any desired radius, from 1/16" to 2" concave, from .00 to 2" convex, which means that radii can now be generated even on carbide tipped cutting tools in a matter of minutes, to within .0005 accuracy on a standard, unformed, cupped diamond wheel. You save headaches, time, and gain increased production. Write for literature and prices that will surprise you.

W. F. MEYERS CO., INC., BEDFORD, INDIANA



One tool

does the work of FOUR *after* sub-zeroing



Increase the life of cutting tools, hobs, and other perishable tools 400% to 1600% by adding Sub-Zero chilling to your heat treating. Sub-Zero transformation of austenite to martensite at – 120 degrees below zero increases the toughness, hardness and ductility of alloy steel, makes expensive tools last many times longer by actual tests.

Sub-Zero industrial chilling machines are especially engineered for metal treatment on a production basis. They have unusually large cooling capacity by virtue of extremely compact design; they are simple to operate and maintain, and are sturdily built. Available in standard and special sizes from 1.5 cubic feet.

Here's Your Proof: Send us a sample tool. Let us Sub-Zero it for your own tests. ***No cost or obligation.***

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REPRESENTATIVES IN PRINCIPAL INDUSTRIAL AREAS.

sub-ZERO products Co.
3930-S3 READING ROAD
CINCINNATI 29, OHIO

Metal-Working News in Brief

Sales & Service Machinery Co., Inc., 3818 Chestnut St., Philadelphia 4, Pa., has been granted an exclusive dealership in the Philadelphia area for the sale of the following lines of machine tools: The R. K. LeBlond Machine Tool Company; Elmes Engineering Division of American Steel Foundries, Inc.; Steelweld Division of Cleveland Crane & Engineering Corporation; Peerless Machine Company; Lucas Machine Division of New Britain Machine Company; Fosdick Machine Tool Company; Rockford Machine Tool Company; Hartford Special Machine Company; and Minster Machine Company. The firm will also serve as distributor for Hammond Machinery Builders, Inc. The above manufacturers will be represented by Sales & Service in the Philadelphia, southern New Jersey, Delaware, Maryland, and Washington, D. C., areas.

— o —

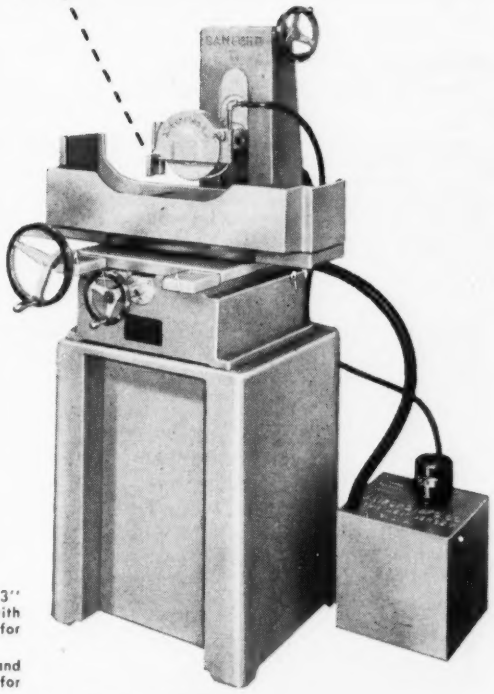
Donald E. Hawkinson has been appointed sales manager of the Special Machine Tool Department of Greenlee Bros. & Co., Rockford, Ill. Mr. Hawkinson has been associated with the company for 26 years. **E. C. Van Tiem**, formerly sales engineer in the Detroit office, has been named manager of that office, succeeding **John M. Macrae** who died recently. Mr. Van Tiem has been associated with the company with Greenlee Bros. & Company for a period of 17 years.

ARROW TOOL & REAMER CO. • Established 1916
Arrow
means a complete
LINE OF END MILLS
Manufacturing skill and tool making experience for over 37 years — adds up to preference for Arrow End Mills.
THIS IS Arrow's 3 FLUTE END MILL
Call your Distributor or write direct for literature
ARROW TOOL & REAMER CO.
418-422 Livernois Ave. • Detroit 9, Michigan

SANFORD
SURFACE GRINDER
MODEL MG

For Dry or Wet* Grinding!

PRECISION • SPEED • SENSITIVITY



Built by manufacturers who concentrate on small grinders only, each Sanford Grinder is an individual project of time tested and proved basic design. Although modest in price, no quality undermining shortcuts are employed to reduce manufacturing costs. Constant repeat orders prove its acceptance.

This sensitive machine grinds to micro-inch accuracy with no vibration, with maximum dimensional stability. Here's why:

- **Transverse ways are double Vee (VV) Meehanite inserts instead of flat surfaces which depend upon unstable jibs for alignment and accuracy.**
- **Needle, Ball and Oilite Anti-Friction bearings are used throughout.**
- **Alignments are electronically checked for accuracy.**
- **Precision slides are ground, lapped and hand spotted.**
- **Dials are large and legible.**

SPECIFICATIONS — 8¾" transverse — 13" longitudinal — 12" vertical under 7" wheel with Adapter. Approximate weight 630 lbs. Send for illustrated bulletin.

Replacement parts, special attachments and reconditioning facilities are available. Send for price list.

*With optional equipment

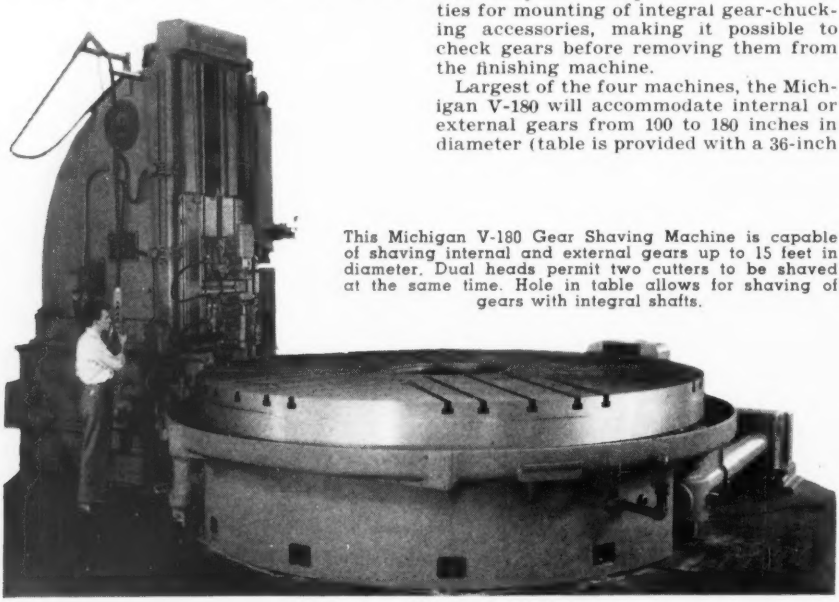
SANFORD MANUFACTURING CORP.
1022 Commerce Ave., Union, N. J.

new shop equipment

Machines Shave Gears up to 15 Feet in Diameter x 48-Inch Face Width

Gears up to 15 feet in diameter and with up to a 48-inch face width can be finished rapidly and accurately on a line of standard vertical large-gear shaving machines, identified as the V-Series, introduced by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. The machines, it is claimed, can be used for spur, helical, or herringbone gears, internal or external, with or without integral shafts, as used in marine, railroad, power plant, ordnance, and other large gear applications. The Michigan V-Series includes four models having 48, 72, 120, and 180-inch gear diameter capacities, respectively. The machines are designed for high versatility and are provided with facilities for mounting of integral gear-chucking accessories, making it possible to check gears before removing them from the finishing machine.

Largest of the four machines, the Michigan V-180 will accommodate internal or external gears from 100 to 180 inches in diameter (table is provided with a 36-inch



This Michigan V-180 Gear Shaving Machine is capable of shaving internal and external gears up to 15 feet in diameter. Dual heads permit two cutters to be shaved at the same time. Hole in table allows for shaving of gears with integral shafts.

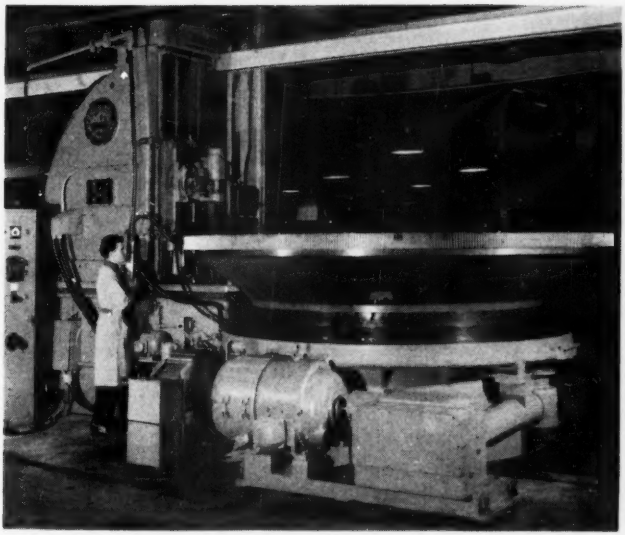
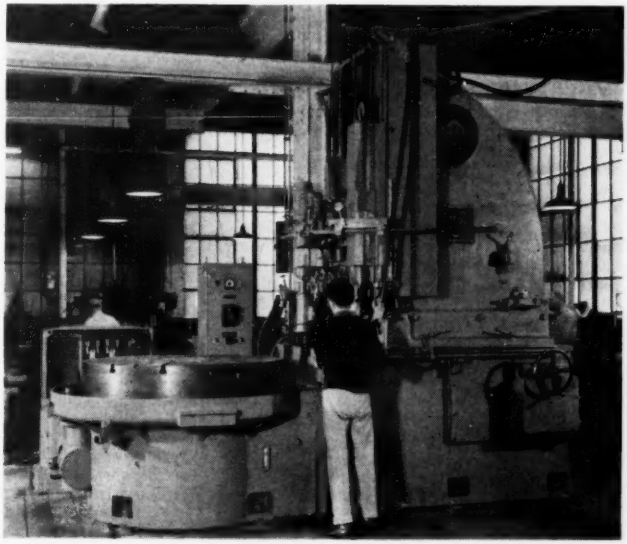


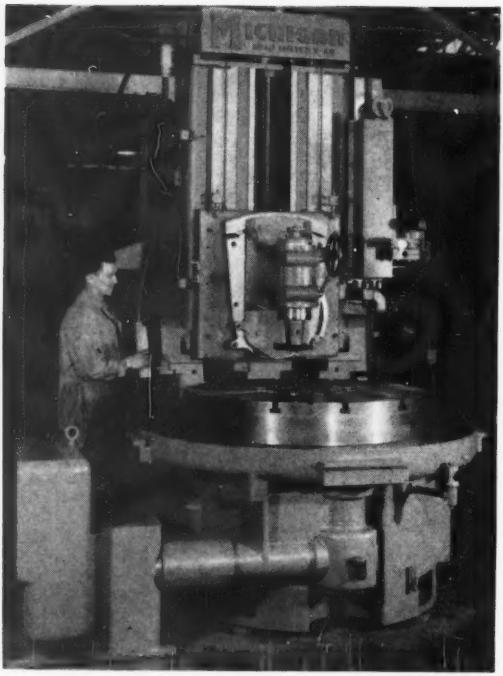
Table drive gear is shown being shaved on Michigan V-120 Gear Shaver.

diameter hole) and has a capacity for shaving spur, helical, and herringbone gears 65 inches wide. The V-120 will shave internal or external gears from 60 to 120 inches in diameter (table is provided with a 30-inch diameter hole to accommodate shafts), and the maximum gear width for spur, helical, and herringbone gears is 50 inches. Having a gear diameter capacity of from 20 to 72 inches, the V-72 is the third in the series and will shave internal or external gears 50 inches in width (table is provided with an 18-inch diameter hole). The V-48 is the smallest of the V-Series and has a gear capacity of from 8 to 48 inches in diameter (table is provided with a 12½-inch diameter hole) and will shave internal, as well as external, gears. The work table on the V-48 is mounted on a preloaded taper roller bearing, and the maximum gear width for spur, helical, and herringbone gears is 30 inches. Magnetic chip conveyors are optional equipment on all models.

All models except the V-48 are available with dual cutting heads which are independently adjustable for correct angle, and the top head may be adjusted for height. In addition to the dual cutter



Side view of Michigan V-72 Gear Shaving Machine. Checking fixture, just above operator, checks runout on shaft and rim, as well as axial pitch of gears being shaved while mounted on the shaving machine.



This Michigan V-48 Gear Shaver is set up for shaving internal gears up to 48-inch diameter and 30-inch face width, with or without integral shafts. It is made to shave external gears as well.

heads, each cutter is said to be actually two cutters in one. The cutter, although of one-piece construction, has a wide groove in its center section giving the effect of two separate cutters and thus providing two shaving zones on the gear. The head of the machine that mounts the serrated-tooth shaving cutters, which are meshed with the gear and traversed back and forth across the tooth face while being fed to depth, can be tilted forward or backward, thus enabling the gear tooth shaved surface to be intentionally tapered to provide total face width contact under deflection conditions that result from the heavy loads transmitted by the gears in service.

A checking device has been designed for the machines so that a gear can be checked for runout on both the shaft and rim, as well as axial pitch, while on the work table. The checking device is mounted independently on the vertical slide.

The tables are mounted on a massive cast-iron base, and the vertical slide is on a large heavy casting which is set on a huge base casting. The tables on the three larger models are supported by an oil film, the pressure of which can be adjusted to suit varying table loads. Provision is made for mounting a turning tool on the lower cutter head in order to take a cut across the top of the work-holding fixture, thus ensuring a plane surface, for mounting the gear, parallel with the top of the work table. Another interesting design feature of the machines is the use of T-slots in the table, enabling fixtures and gears to be mounted in the shaving machine with absolute concentricity between the shaved gear tooth surfaces and the table bearing. A further advantage of the hollow table design is that the gear can be located in the same position and on the same face that it is located in the previous hobbing machine operation where the gear teeth are generated.

Work table drive motors on the V-72, V-120, and V-180 are d.c. 230-volt, allowing an infinite choice of table drive speeds from 0.93 to 15.16 r.p.m. on the V-180, 1.29 to 28.62 r.p.m. on the V-120, and 3.25 to 72.33 r.p.m. on the V-72. On the V-48, the drive motor is a.c. 220/440-volt, providing an infinite choice of table drive speeds from 15.6 to 186.6 revolutions per minute.

Double-Ram Hydraulic Table Is Designed for Feeding Large, Heavy Sheets

Rack Hydraulic Equipment Corp., Connellsville, Pa., has announced a double-ram table which is designed for feeding large, heavy sheets to presses, brakes, or shears. The table has a load capacity of from 3 to 10 tons and is equipped with sturdy swivel casters and smooth-rolling wheels to provide maximum maneuverability in storage loading areas and between machines. The double-ram table has a 36 x 96-inch top which is hydraulic-

A *better* Lathe from any *angle*.

(1) "Zero Precision" Tapered Roller Bearings—the best Timkens on any lathe. (2) Large collet capacity with Choice of Center Distance. (3) Hobcut gears throughout for smooth operation. (4) Modern full double wall apron. (5) Bed has an engineered backbone. (6) Two V-belts to spindle for greater pulling power. (7) Holds precise accuracy for years.

By whatever standards you measure a lathe—bearings[1], capacity[2], gearing[3], apron[4], bed[5], power to spindle[6], accuracy[7]—whatever is important to *you*, you will find it completely satisfied in a SHELDON lathe.

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SHELDON MACHINE CO., Inc., 4250 North Knox Ave., Chicago 41, Ill.

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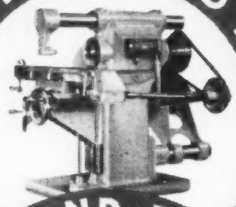
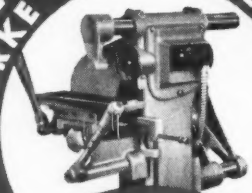
FOR EVERY PURPOSE

Thousands of efficient, low cost Burke Bench Millers are proving their superiority in Tool, Development and School Shops and a wide variety of mass production operations.

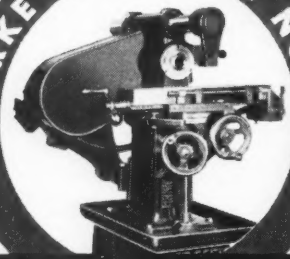
BURKE POWER FEED NO. 4



BURKE HAND FEED NO. 3



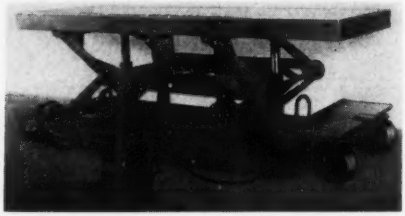
BURKE UNIVERSAL NO. 4



Send for complete data on models attachments, accessories and suggestions for putting Burke's to work for your profit.

THE U. S. - BURKE
MACHINE TOOL DIV.

Brotherton Road 3, Cincinnati 27, Ohio



Rack Double-Ram Sheet Feeding Table

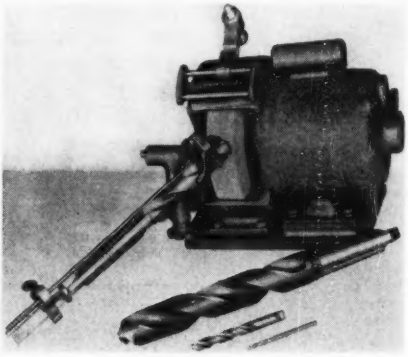
ally operated by a multiple-speed foot pump. The table is also furnished with electric drives.

Twist Drill Grinder Requires Only Two Holders

Designated as the Model 200, a twist drill grinder which is said to require only two holders to sharpen all sizes of straight or taper-shank two-flute twist drills from ⅛ to 1½ inches in diameter has been announced by Alden Industries, 1390 Sackett St., Cuyahoga Falls, Ohio. An infinite range of point angles for drilling different kinds of materials, it is claimed, is instantly obtained by a simple one-knob adjustment. The grinder is accurately calibrated for the standard 59-degree point, as well as other frequently used points, such as 90, 130, and 140 degree. A uniform grind on each lip is obtained, and compensation for wheel wear is made automatically by a built-in diamond wheel dresser.

The grinder is furnished with a ¼-h.p. 110-volt 60-cycle motor which is sealed against dust.

Alden Model 200 Twist Drill Grinder



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"Better performance under all conditions" . . . is what shop men say about the Procunier Tapping Machine with the "Hi-Boy" Lubricating Pump. Tested on many kinds of tapping operations . . . these new "job tested" pumps are enabling operators to cut cleaner, faster, deeper threads with greater ease. They also permit tapping in tougher, harder metals with less tap breakage. The "Hi-Boy" is a motor-driven gear type pump which provides a continuous flow of lubricant to the tap at all times . . . even while "backing" out.

The famous Procunier foot pedal mechanism leaves the operator's hands free for work. The unique compensating springs may be pre-set for proper pressure to tap . . . regardless of pedal pressure.

The result is high speed, uniform tapping with a minimum of broken taps . . . *better performance of every job.*

Write for FREE Circular

giving full details on this universal tapping machine and how it can help you in *your* shop.

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12 S. Clinton St., Chicago 6, Ill. **Dept. 5**

Gentlemen: Please send me your illustrated brochures which give complete prices and specifications on Procunier High Speed Tapping Heads and Machines.

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Procunier

Safety Chuck Co.

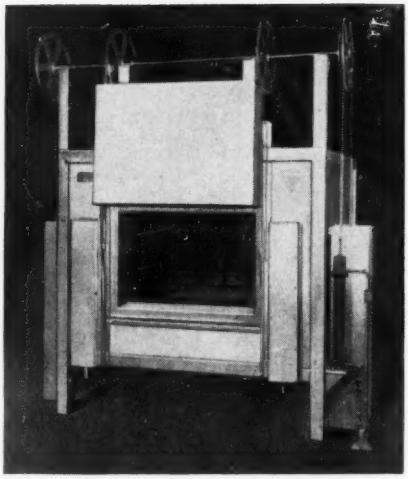
12 South Clinton Street
Chicago 6, Illinois

Electric Furnace Is Designed for Porcelain Enameling and Heat-Treating Operations

Designated as the Model TF-24, an electric furnace which is designed for porcelain enameling, as well as a wide variety of heat-treating operations, and which has an adequate chamber size of 36 inches wide x 48 inches deep x 24 inches high has been announced by Pereny Equipment Co., 893 Chambers Rd., Columbus 12, Ohio. The furnace is said to operate at a temperature of 2,400 deg. F. with a work load of 350 lb. of metal per hour.

Heating is accomplished by Globar elements which are located on each side of the chamber, and the elements, it is claimed, are sufficiently powered to provide unusually rapid "recovery" time after the door is opened or closed during the change of loads. The door is of a counterbalanced atmosphere-tight design and is operated by a foot-controlled air cylinder.

The unit is of all-welded construction and measures 77 inches wide x 71 inches deep x 80 inches high overall. The hearth is of either solid SiC tile or triangular rails. The furnace is powered by 60-kw. 440-volt 60-cycle 3-phase supply. The transformer is a 60 kva voltage-regulating insulated type with 36 taps, and includes a direct-reading power input meter.

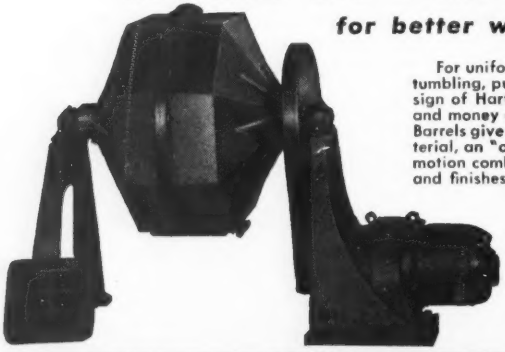


Pereco Model TF-24 Electric Furnace

HARTFORD *TRIPLE ACTION*

CUTTING *and* TUMBLING BARRELS

for better work in less time!



For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request.

THE HARTFORD STEEL BALL CO.

HARTFORD 6, CONN.

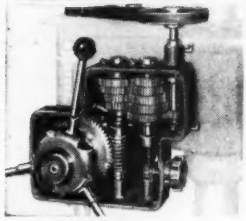
DETROIT	CHICAGO	NEWARK, N. J.	LOS ANGELES, CAL.	EXPORT
W. S. TURNER	VICTOR R. CLARK	GUARANTEE TRUST BLDG.	E. O. MALTBY CO.	R. A. RODRIGUEZ, INC.
445 NEW CENTER BLDG.	605 W. WASHINGTON BLVD.	972 BROAD ST.	1718 SOUTH FLOWER ST.	55 W. 42ND ST., NEW YORK

2H902

NEW!

CLAUSING

18" HEAVY-DUTY POWER FEED DRILL PRESS



★ Drills 1" cast iron, ¾" steel ★ No. 3 Morse Taper, 6½" spindle travel ★ HEAVY-DUTY GEAR-DRIVEN POWER FEED TO TAKE FULL ADVANTAGE OF THIS BIG TOOL AND JOB CAPACITY.

An 18" *heavy-duty* drill press, with larger tool and job capacity, PLUS a *heavy-duty* GEAR-DRIVEN power feed to make effective use of its capacity — those are the brief facts about this fine new Clausing development.

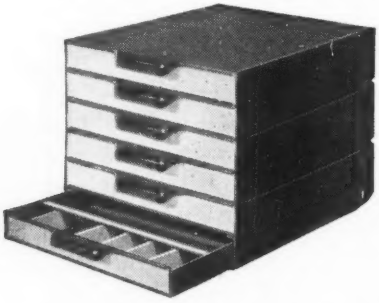
The power feed, with its large heavy-duty gears, is positive and sure — NO belt slippage to reduce power. Feed selection is instant — BY DIAL — no belts to change. Add the Clausing features of new spindle bearing engineering, vernier depth stop, and exclusive head and table positioning mechanism — and you know this is a tool that can save you plenty on both set-up and operating time. Get all the facts — send for new literature today.

Atlas CLAUSING PRECISION MACHINE TOOLS DIVISION ATLAS PRESS COMPANY KALAMAZOO, MICHIGAN U.S.A.

CLAUSING DIVISION ATLAS PRESS COMPANY
5-110 N. PITCHER ST., KALAMAZOO, MICHIGAN

Steel Cabinet Is Designed for Storing Small Parts

Designated as the "Little Gem," a steel storage cabinet which is designed to provide quick access to a variety of small parts has been announced by Equipto Division, Aurora Equipment Co., 422 Cleveland Ave., Aurora, Ill. The cabinet, it is claimed, can be used either individually, in stacks, under counters, or on shelving. The drawer of the unit measures 11 x 11 x 1¼ inches and accommodates up to 28 adjustable compartments enclosed on all four sides and bottom. The front of each compartment is curved to facilitate the easy removal of parts, and overhang at the rear is said to prevent shuffling of items when the drawer is jerked open or slammed shut. Label holders are provided on each compartment.



Equipto "Little Gem" Steel Storage Cabinets

Free-Machining Screw Steel

Jones & Laughlin Steel Corp., Gateway Center, Pittsburgh 30, Pa., has announced a free-machining steel designated as the J&L "1200" Series, for making screws, nuts, bolts, studs, and other small machined products. Produced by the open hearth process, the steel is furnished in the form of cold-finished bars. It is said to provide uniformity, machinability, and quality finish, and is comparable to the "1200" series steels listed by the American Iron and Steel Institute. The steel is also said to meet specifications of the Society of Automotive Engineers' "1100" series listings.

Enco

TURRET TOOL POSTS

SAVE VALUABLE SETUP TIME

The three photos at right illustrate the flexibility of 12-position indexing, whereby each tool may be used in three different working positions.

¾" square tool bit mounted in Model 4½-S turret used for facing cut.

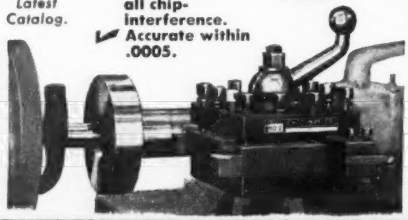
Same tool used for broadface turning merely by indexing turret one position or 30°.

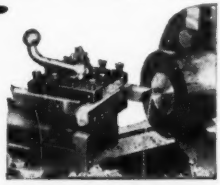
Same tool used for inside chamfer merely by indexing back two positions or 60

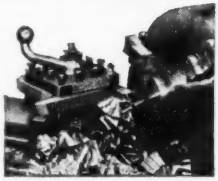
- Keeps setting accurately.
- Indexing is self-contained —eliminates all chip-interference.
- Accurate within .0005.
- 12-position indexing.
- Hardened steel construction.
- Mounts rigidly in compound T-slot.

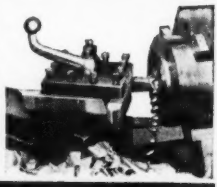
Send for Latest Catalog.

Manufacturers of the most complete line of Hexturret Bed Turrets, Turret Tool Posts and Tail Stock Turrets in the Country. Send for Catalog No. 53.









ENCO Manufacturing Co., Dept. 153

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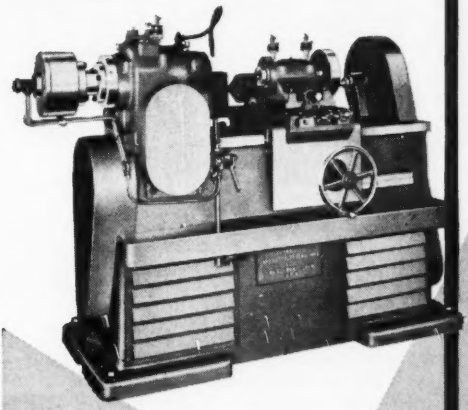
the only solution to high thread production costs . . . install a fully automatic

COULTER THREADING MACHINE

Model "H1" — for precision, internal, external, right and left hand threads.



COULTER has been building production machines since 1896. Every new development for *faster, more accurate* threading created by engineers with immense experience, background and know-how is incorporated on all Coulter Threading Machines. That is why COULTER is the most respected name in machinery the world over. If you are confronted with a thread production problem, please write or phone . . . COULTER engineers will help you. Catalogs and specifications of machines are available at no cost.

Remember . . . a Coulter does it better . . . faster, AUTOMATICALLY

The *James Coulter Machine Co.*

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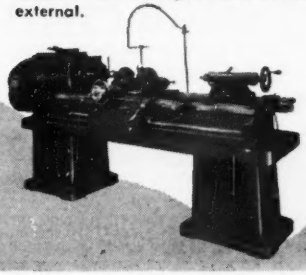
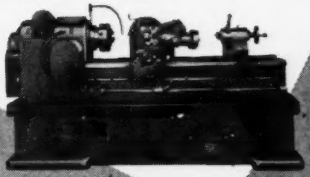
Model "L1" — For long, precision, square, standard and 29 degree threads. Internal or external.



"THREADMASTER" — For precision, long and short traversing, elevating, cross feed and lead screws.



Toolroom Surface Grinder Features Unusual Versatility and Flexibility

Designated as the Model D6, a toolroom surface grinder which features unusual versatility and flexibility and which has a long table has been announced by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. The grinder is designed to accommodate attachments or to incorporate additional components, thus broadening its scope of applications. The machine utilizes full hydraulic cross-feed which is standard equipment.

DoAll Model D6 Toolroom Surface Grinder

The coolant system is said to afford finger-tip control for the selection of one of three cooling methods; namely, "cool grinding," whereby the coolant is introduced to the sides of the wheel and flows through the wheel as a result of a centrifugal force; flood cooling; and combination cool grinding and flood cooling when unusually heavy cuts are to be taken. According to the manufacturer, the versatility of coolant control is achieved through a manifold wheel guard. Only a single hose connection is required between the reservoir-pump-filter unit and the guard. The manifold supplies three valves—the metering sight feed valves (or "drip control" valves) for cool grinding and the control valve for flood grinding.

The front cover of the wheel guard is hinged and can be raised out of the way,

CAMS

We are fully equipped to **GRIND** OR **MILL** a complete range of CAMS to your specifications on our **ROWBOTTOM** Cam Milling Machines.

Your inquiries answered promptly.

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MOTOR MICA
TRADE MARK REG. U. S. PAT. OFF.
COOLING
ANTI-FRICTION COMPOUND
In White Powdered Form
COOLS HOT BEARINGS
SAVES WEAR ON MOVING PARTS
Write For Free Sample
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Beaver

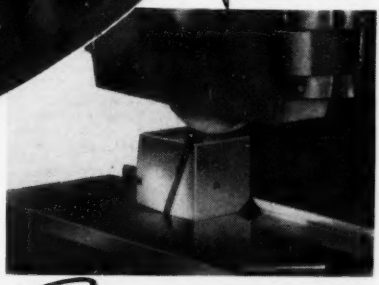
SOLID CARBIDE, INSERTED BLADE, MILLING CUTTERS OFFER MANY ADVANTAGES

Exploded view showing Beaver's simple, positive, blade locking system.

The Beaver system of fast, accurate, cutting-blade maintenance is a time and money saver.

Beaver's blade-grinding fixture enables you to grind blades individually and uniformly on your own surface grinder. This system also permits accurate sharpening for short overhang set-up, which means less breakage, longer blade-life and less down-time for repair. Individual sharpening results in less blade-loss per sharpening. Extra sets of sharpened blades can be kept on hand.

With Beaver's specially designed, blade-setting fixture you can install new blades quickly and accurately. The entire Beaver operation of removal, sharpen and reset, cuts "in assembly" sharpening time in half.



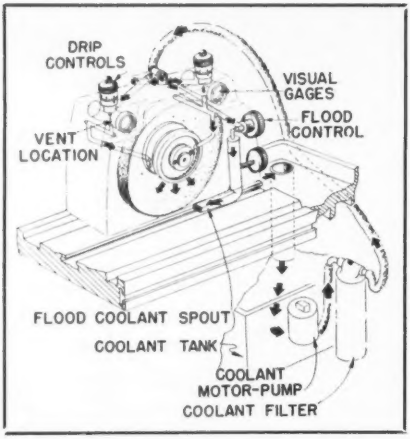
Beaver Blade-grinding fixture.

Beaver Blade-setting fixture.

See our Catalog 52 for cost reducing Beaver Tools

Beaver TOOL AND ENGINEERING CORPORATION

2850 ROCHESTER ROAD • BOX 429, ROYAL OAK, MICH., Teletype - Big Beaver 648



Schematic diagram depicting coolant flow in DoAll's "three-in-one" coolant system. Unique manifolded wheel guard makes choice of coolant method used.

thus permitting the removal of a wheel without removing the guard cover. The entire guard, it is claimed, can be removed without removing the wheel from the spindle.

The coolant tank, which is a combination coolant pump and motor, plus filter, comprises one unit that rides on casters. Return coolant is subjected to a sequence of filtering and settling processes that are said to assure purity and freedom from unwanted materials before the coolant is pumped back to the wheel. The coolant tank has a capacity of 20 gallons.

The grinder also utilizes a high-speed spindle attachment which is said to afford unusually high spindle speeds required in using small diameter wheels. The attachment is essentially another spindle which is belt driven from the grinder spindle. A variable-speed spindle is incorporated in the machine, providing a low speed range of from 400 to 4,000 r.p.m. and a second speed range of from 4,000 to 20,000 r.p.m. A speed indicator is also provided.

The hydraulic cross-feed is said to index automatically at both ends of the table stroke, and when the lateral motion of the table is stopped, the cross-feed hydraulic mechanism can be used to move the saddle back and forth under the wheel. Calibrated slip rings, which can be zeroed after an initial cut and thickness measurement of the workpiece

A BETTER BORING BAR

OUR fine list of Customers is PROOF that our method of broaching square holes makes a better fit for the tool bit. This means more rigidity and longer life especially with tungsten Carbide. We also make bars for our Type B and Type C cutters or a combination of tool bits and cutters. Bars are made to suit customers' requirements as to method of drive, pilot, number of holes, angle of bit, etc. Our two-bladed cutters can be floated in the bar or held rigidly. Cutters are interchangeable—hence can be ground in an arbor in the tool room and only require a few seconds for inserting in the bar.

Square hole sizes range from ⅛" up to and including ¼".

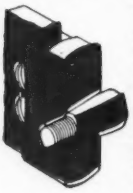
THE DETROIT BORING BAR CO.

688 E. FORT ST. Detroit 26, Mich.

Established 1927

TYPE "B" AND "C" CUTTERS

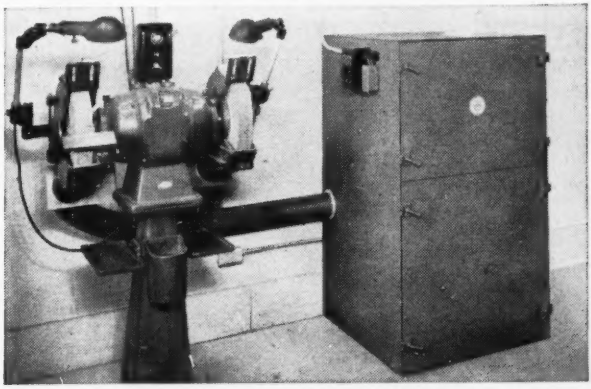
Suitable for Tipping With Tungsten Carbide



"B" A strong rigid serrated 2-bladed cutter—located in the bar with a taper pin. Bores holes accurately to close limits. Can be expanded and reground giving long life. Sizes ⅛" dia. up to 6".

"C" A simple 2-bladed reaming cutter. Can be expanded and reground. Located in the bar by a hardened V. This V never has to be reground as blades are expanded.

Fits other bars with slots
¾" x ⅞"
1½" x 1"
⅝" x 1⅛"
⅞" x 1½".

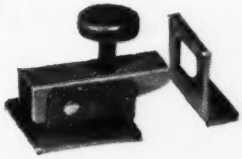


. . . from abrasive dust hazards with TORIT DUST COLLECTORS

Here is a safe grinding installation. Guarded wheels, localized lighting, a well placed starting switch, and most of all hoods and piping leading to a Torit Dust Collector. Here no abrasive dusts will hamper working conditions or cause damage to finished parts or expensive equipment.

To *score* top production in your plant play it *safe*. Equip machines with Torit Dust Collectors. There are types for all standard dust problems and for *inning* after *inning* they'll keep your plant from being caught *off-base* by uncomfortable and dangerous dust conditions. Your team will *play ball* right up to the last pitch.

see our catalog in MACHINE TOOL CATALOGS or write for copy



TORIT DOOR FASTENER

The sturdy and efficient door fastener used on Torit cabinets is available for use on your own products. Strike plate either flat or angular. Write for quantity prices.

Get the complete *line-up* by writing:

TORIT MANUFACTURING COMPANY

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have been made, are mounted on the handwheels. All operating levers of the grinder, it is claimed, are large and accessible. A motorized column raiser and other motorized controls are available as optional equipment.

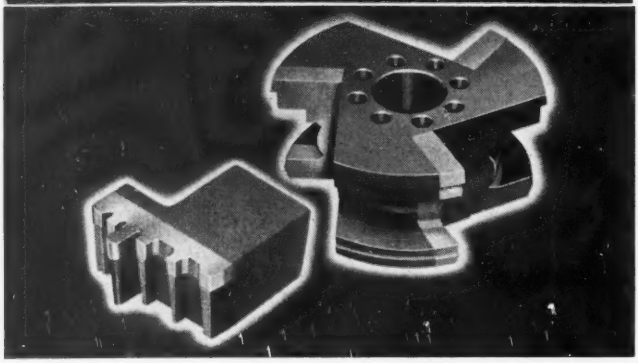
Hand Machine Has Varied Speed of Reciprocation from 0 to 100 Strokes Per Second

Driven by a flexible shaft having standard connections, a hand reciprocating machine, designated as the Di-Profiler, which is said to have a controlled stroke, variable from 0 to 6 mm. (¼ inch), and a speed of reciprocation that can be varied from 0 to 100 strokes per second has been announced by Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill. Designed for filing, lapping, scraping, honing, and polishing operations, the tool weighs less than 1 lb. and is said to be free from vibration, thus making it easy to control during operation.

According to the manufacturer, the machine is ideal for honing and lapping straight and curved surfaces; for reworking hardened materials; for finishing complicated dies and molds and regular or irregular drawing dies; and for precision lapping of small holes. A wide range of diamond and tungsten - carbide files, points, blades, scrapers, cutters, and other tools are available for use with the hand reciprocating machine.

Engis Di-Profiler

YESTERDAY'S PIONEER . . . TODAY'S LEADER



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Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.

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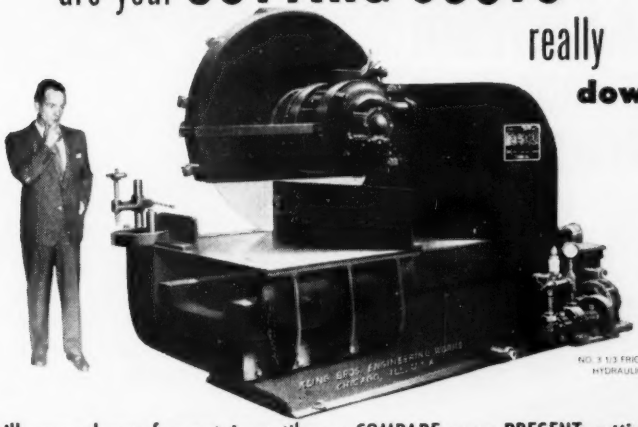
Automatic Stud Puller and Chuck

Designated as the "Aptco," an all-purpose keyless automatic stud puller and chuck which is designed to extract and set studs is now being distributed by Faver, Inc., 770 S. Second West, Salt

are your CUTTING COSTS really down far enough ?



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HYDRAULIC FEED

you'll never know for certain until you COMPARE your PRESENT cutting speed with

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What is friction sawing?
It is a proven means of using mechanical heat to cut steel. The weakened steel is removed by each succeeding section of the cooled saw blade—with no apparent wear on the blade.

Fastest, all-around cut-off machine in the shop. No set-up changes required to cut any sequence of structural shapes. No distortion. One Kling Friction Saw will take the place of several separate shears or slow speed saws. Cuts alloy steels, too, in record time. Because blade life is measured in thousands of cuts, you eliminate downtime and save on tool costs.

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1328 N. Kostner Ave., Chicago 51, Illinois

How long would it take you to cut these pieces?	Cut it with a Kling in † . .
24" 100 lb. I Beam	28 seconds
15" 55 lb. Channel	15 seconds
8" x 8" x 34.3 lb. H Beam	10 seconds
100 lb. A.R.A. Rail	9 seconds
6¼" x 6½" x 19.8 lb. Tee	5 seconds
8" x 8" x ¾" Angle	11 seconds
3" Square	10 seconds
4" Round	15 seconds
6" O.D. Tube, ½" Wall	11 seconds

† Approximate Times

Since 1892 **Kling** ***...an investment in speed!***

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TOOLS KEEP YOU AT TOP PRODUCTION WITH MINIMUM COST

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"Aptco" All-Purpose Keyless Automatic Stud Puller and Chuck

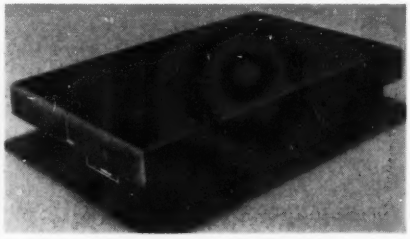
Lake City, Utah. According to the manufacturer, the tool is capable of doing drill press work and is adaptable to milling machines, lathes, and portable reverberating machines. The tool is made of fine quality steel to minimize stud bolt breakage due to its dead center pull. The stud puller and chuck, it is claimed, does not score or mark stud bolts, is lightweight, and easy to handle.

Surface Plate Is Said to Have Accuracy of up to 0.00005 Inch

A surface plate which is made from a dense, extremely hard, and uniform-grained black granite and which is said to have a guaranteed surface accuracy of 0.00005 inch has been announced by Lawley Granite Surface Plate Co., 1412 Packard Bldg., Philadelphia 2, Pa. According to the manufacturer, the plate permits extremely precise measurements in quality control, manufacturing, and inspection and will not warp or rust regardless of temperature changes or shock. The plate is said to resist abrasion and impact and develop no humps or burrs.

Available with two or four lips, the plate can be supplied in standard sizes from 12 x 18 x 4 inches to 24 x 36 x 6 inches. Other sizes can be obtained on special order.

Lawley Black Granite Surface Plate



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Magni-Focuser—the binocular magnifier—reduces eye-strain and *prevents squinting*—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

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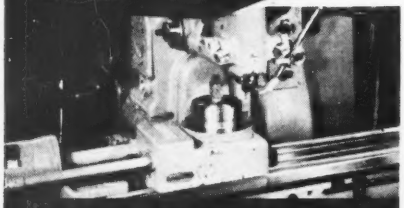

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In many cases, the addition of this Automatic Index Base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this service.

Accurate Spacing, Powerful Clamping Insures Accuracy

Sundstrand Automatic Index Base

This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

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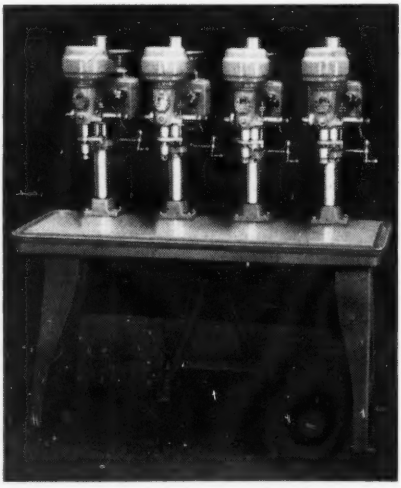
SUNDSTRAND

SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

Drill Press Is Designed for Multiple Operations

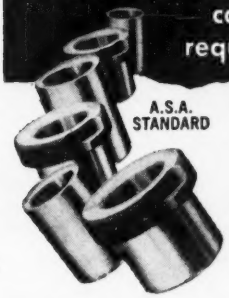
A production model drill press which is designed for multiple operations involving drilling, tapping, reaming, burring, and chamfering has been announced by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind. The machine is available in four types, equipped with from one to four drill heads. Each drill head is essentially the company's 14-inch precision model drill press. A simple belt tension release is said to provide quick speed changes. The machine has a maximum capacity of 7 inches from the spindle to the column and 18 inches from the chuck to the table. Either a ⅓ or ½-h.p. motor can be used, obtaining an approximate spindle speed range from 720 to 4,325 r.p.m. A built-in work l' t is provided for each drill head.



South Bend Four-Spindle Production Model Drill Press

The machine incorporates a drill head positioning attachment which is said to provide each drill head assembly 4 inches of vertical adjustment at any one setting. The work table features cast-in ribs and is accurately machined. Large coolant grooves, which slope to the rear to a built-in chip trap, are incorporated in the table. The work table measures from 14 x 15 inches for the single-spindle model up to 14 x 55 inches for the four-spindle model.

Look to *SID TOOL* for your complete requirements



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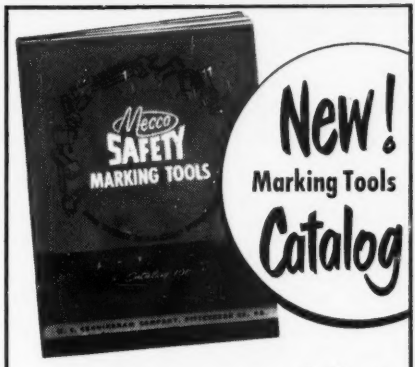

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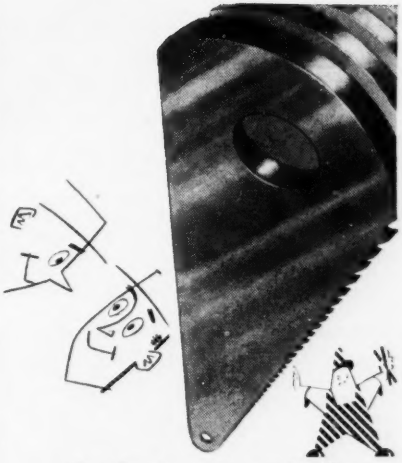

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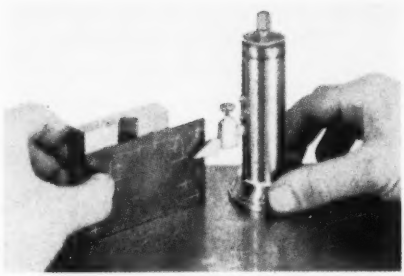
CLEMSON BROS., Inc.
MIDDLETOWN, N. Y., U.S.A.

Makers of Hand and Power Hack Saw Blades, Frames, Metal Cutting Band Saw Blades and Clemson Lawn Machines

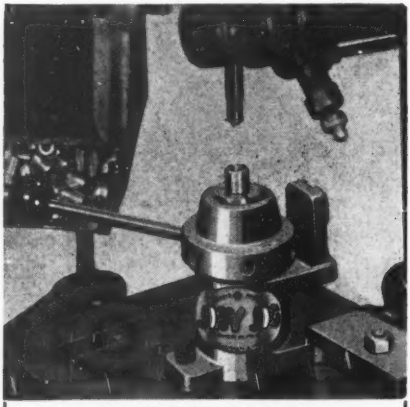
Height Gage Has Direct Capacity of 3 Inches

Fairfield Gauge Co., Inc., 174 Herbert St., Bridgeport 6, Conn., has announced the Micro-Height Gage which is said to combine the easy reading of a micrometer caliper with the scribing features of a vernier height gage. The gage is supplied equipped with a high-speed steel scriber which is said to provide a 2-inch direct capacity with the scriber inserted in the support with the straight edge down. By reversing the scriber in the support, exactly 1 inch is said to be gained, thus increasing the direct capacity of the gage to 3 inches. According to the manufacturer, by using the gage on a toolmaker's 1-2-3 block, measurements can be made up to 6 inches.



Fairfield Micro-Height Gage in use

The Micro-Height Gage has a lead screw which is heat-treated and accurately ground, thus making it possible to replace the scriber with a dial indicator for quickly and accurately determining the amount of error on center distances or surfaces. Large graduations on the barrel, from 0 to 2 inches, are said to be easy to read. Micrometer adjustments are made with a knurled thimble on the top of the gage.



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This fast, accurate, low-cost collet-type work holder speeds secondary operation drilling, milling, tapping, etc., either horizontal or vertical. • Guide bushing support (not shown) for cross hole drilling. • Spring ejector (optional) speeds work. • Simple, dependable, proven in service. Send for our folder.

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P. O. Box 162, Dept. M, Cincinnati 15, Ohio

Machine Can Drill up to 1-1/4-Inch Diameter Holes in Steel

Designated as the No. 3 MVB, a heavy-duty drilling machine which is said to be capable of drilling up to 1¼-inch diameter holes in steel and 1½-inch diameter holes in cast iron has been announced by Leland-Gifford Co., Worcester 1, Massachusetts.

The machine has a 24-inch swing,

DIAMOND PENETRATORS

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ACCURACY GUARANTEED

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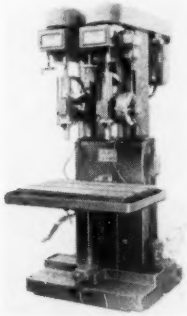
capacity of No. 3 or No. 4 Morse taper, and from one to four spindles. Power, hand, or hydraulic feeds are available. The power feed has three feed rates, an adjustable depth stop, and a safety slip clutch. The hydraulic feed has either plain or step-by-step controls.

The machine incorporates a 4-speed motor with back gears which



Leland-Gifford No. 3 MVB Heavy-Duty Drilling Machine

is said to provide eight standard speeds; however, a single-speed motor with or without back gears or a 4-speed motor without back gears can be furnished for other speed ranges. According to the manufacturer, all speed changes, including back gear shifting, are made instantly without stopping the machine. The overall height of the machine is 92¾ inches.

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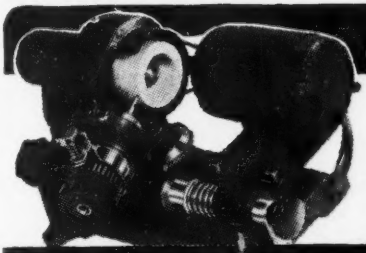

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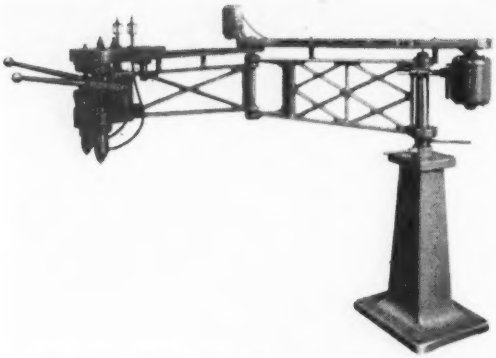


Ekstrom, Carlson No. 71DS Double-Spindle Radial-Arm Drilling Machine

Double-Spindle Radial-Arm Drill Has Dual Spindle Speeds of 5,000 and 8,000 R.P.M.

Designated as the Type DS, a double-spindle radial-arm drilling machine, especially designed for the aircraft industry, which features dual spindle speeds of 5,000 and 8,000 r.p.m. with a maximum vertical spindle travel of 4½ inches has been announced by Ekstrom, Carlson & Co., Dept. M-14, 1400 Railroad Ave., Rockford, Ill. The machine has a fixed center-to-center distance between drill spindles of 6 inches and a drill chuck capacity of from 0 to ⅜ inch. The drill incorporates 1 h.p. spindle drive motors and has a maximum vertical turret post adjustment of 6 inches.

The Type DS machine is available in two sizes with three models of each size, providing a radial reach of 30 and 71 inches. One model is for bench or table mounting with no vertical adjustment; one is for bench or table mounting with a 6-inch vertical adjustment; and the other is complete with cast iron base with a 6-inch vertical adjustment. A gravity-feed lubricating system for fast drilling operations can be supplied as optional equipment.

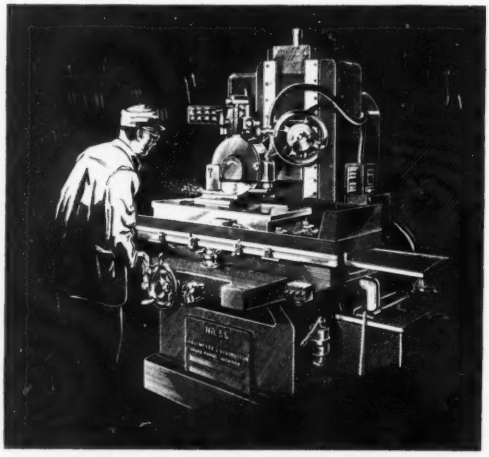
ABSOLUTE

TOLERANCE

CONTROL

When job specifications leave no leeway, when extreme tolerances must be rigidly maintained . . . that's when the built-in precision of Grand Rapids Grinders proves most valuable.

Defense commitments are delaying rapid fulfillment of your orders . . . but as always we're doing our best to serve you.



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NAMEPLATE MARKING

Model No. 4

The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

NAMEPLATE DETAIL PRESS.

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- Perfect Alignment
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Turn the heat on production. Heat treat carbon and high speed steels, dies and tools in your own plant with JOHNSON No. 120 Hi-Speed. Fast heat-up saves time and gas. Temperatures easily regulated with accuracy. Firebox: 5 x 7¾ x 13½. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

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4	5	3	2.50
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6	7 1/4	4	3.00
8	9 1/2	5	4.00
10	11 3/4	6	6.00
12	14	7	8.00
18	20 3/4	10	25.00
24	24	13	30.00
30	30	15	45.00
36	36	18	70.00
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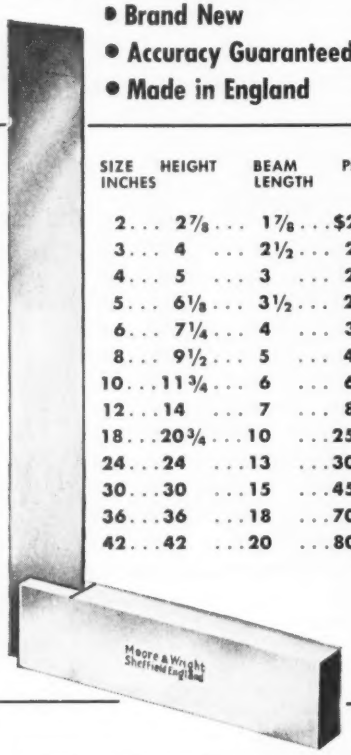

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Telephone: WAlker 5-4048

Air Clamps and Valves

Mead Specialties Co., Dept. CV-42, 4114 N. Knox Ave., Chicago 41, Ill., has added three new air clamps (spring return air cylinders) and two new air valves to its line of air-operated cylinders. The new air cylinders are the Model H-71 with a power factor of 7 times line pressure, 1-inch stroke, and 3-inch bore; Model H-72 with a power factor of 7 times line pressure, stroke of 2 inches, and 3-inch bore; and Model H-73 with a power factor of 7 times line pressure, 3-inch stroke, and 3-inch bore.

Mead Air Clamps and Air Valves

The new air valves include a Model PC-101 which is the same as the Model FT-101; however, in place of a lever, the new valve has a button mounted directly on the valve plunger for actuation by the operator's palm or fist. The Model PC-101 has full $\frac{1}{8}$-inch openings throughout and is provided with hose npiples to fit $\frac{3}{8}$-inch i.d. hose.

The other new valve is the Model PC-1 which is a variation of the Model FT-1 and is unusually compact and easy to mount. According to the manufacturer, this model is quick-acting with air cylinders up to 3-inch bore and is provided with hose nipples to fit $\frac{1}{4}$-inch i.d. hose. With 1,000 p.s.i. air line pressure, a force of approximately 10 lb. is required to push the button.

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Conserve valuable production time by using the fully universal, easily-operated MASTER MULTI-SWIVEL VISE for intricate, angular set-ups in your shop. Three swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional.

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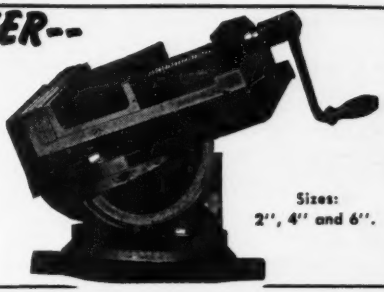
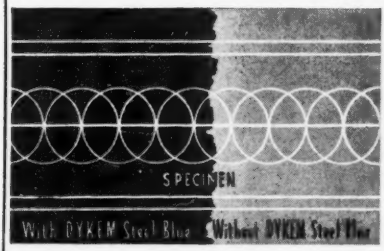


Sizes:
2", 4" and 6".



DYKEM STEEL BLUE

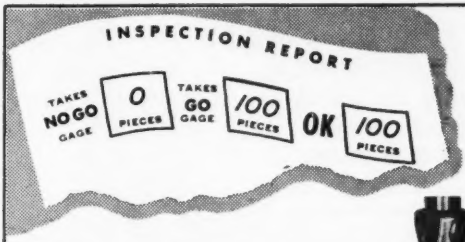
Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

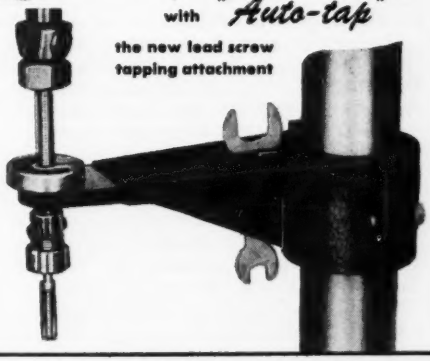
THE DYKEM COMPANY

2301F NORTH 11TH ST. ST. LOUIS, MO.



eliminate your tapping problems..

with *"Auto-tap"*
the new lead screw tapping attachment



your inspection department records will show that parts tapped with *"Auto-tap"* are consistently free from rejects . . . drives the tap and takes the load . . . your taps last *much* longer

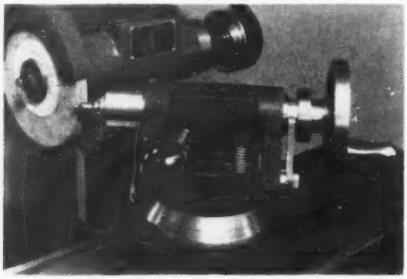
Excellent for production tapping
Write for illustrated literature and price lists.

Automatic Methods INC.
"PRECISION PARTS FOR THE AIRCRAFT INDUSTRY"

42 Walnut St., Bldg. 188, Newark 2, N. J.

Relief Grinding Fixture Features Rocking Head

S & D Engineering Co., 525 Commercial St., Glendale 3, Calif., has announced the Studler Relief Grinding Fixture which incorporates a rocking head to permit



Studler Relief Grinding Fixture set up for use

drawing the cutter or reamer away from the wheel for indexing and retracting the spindle. The fixture is designed for the relief grinding of end mills, (spiral and straight flutes), countersinks, spot facers, center drills, and reamers. Tools are held in the spindle by collet bushings ranging in sizes from ⅛ to ¾ inch and from ¾ to 1 inch. A second spindle or special collet bushing can be furnished for holding any type of cutter or center up to 1¼ inches in diameter.

The fixture is supplied with two types of bases, one of which is a hinged type for angular grinding. Either base will swivel to any position radially.

Diamond Wheel Oil for Grinding Carbides

Carbide Finishing Products, 95 Buckingham Ave., Milford, Conn., has announced a Precision Diamond Wheel Oil which is said to be a specially compounded low viscosity oil developed to clean and lubricate diamond wheels, as well as to prevent glazing, wheel checks, and loading, when grinding carbides. Designed for use on resinoid, vitrified, or metal-bonded diamond wheels, the oil, it is claimed, contains no kerosene, will not gum, and is chemically inert.

In use, the oil is applied to the face of the diamond wheel with a felt wick. A special oil and coolant gravity felt is available, if desired, for applying the oil to ensure a continuous oil flow.

PRECISION 16" DRILL PRESS

saves valuable time in tool-room and model shop by reducing set-up time and supplying correct speeds.

150 to 4000 R.P.M. INSTANT SELECTION

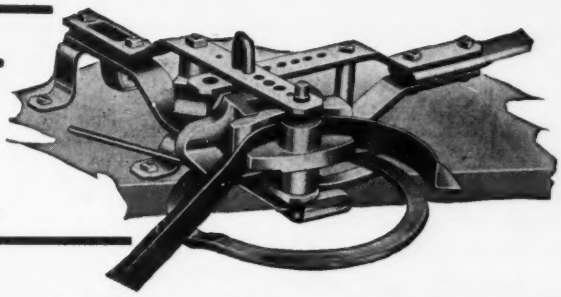
for drilling, reaming, spot-facing, counter-boring and tapping. Variable speed spindle with built-in back gears, driven by a ½ HP single or three phase built-in motor. Completely enclosed drill head design; no belt changing required.

FEATURES . . . Convenient direct reading infinitely variable spindle speed control dial, together with a drill size, speed and material chart; quick-set vernier depth control; sealed-for-life ball bearings throughout; heavy construction plus precision machining for accurate and dependable performance; counterbalanced head on bench model; tilting table and ground base on floor model; No. 2 Morse taper or Jacobs No. 2A taper spindle.

FREE DATA on this advanced design precision drilling machine is available upon request, and on 8" Models with variable speed up to 15,000 RPM; 5/32" Cap. Manual or Air Feed with hydraulic control.

The ELECTRO-MECHANO Co.,
265 East Erie Street, Milwaukee 2, Wisconsin

ONE MAN...
bends 2" x 2" x 3/16"
Angle Iron
EASILY...



with the . . . HYDRAULIC POWERED

HOSSFELD UNIVERSAL IRON BENDER

Hydraulic unit provides plenty of bending power at your fingertips for smooth effortless bending. Reduce hand labor . . . speed up work . . . improve quality of bends. Fast and accurate, the Hossfeld Hydraulic Bender handles rounds, flats, pipe and angle iron. Forms rings, coils, "U" and "S" bends, eyebolts, spring eyes, etc. Gain higher production with lower labor costs.

Write NOW . . . for Complete Details!

HOSSFELD MANUFACTURING COMPANY

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DEALERS Write for Our PROPOSAL

The BARKER "MILLER"

PRECISION - PRODUCTION - ECONOMY

Pre-loaded, double row ball bearing spindle.

at a rapid rate by *inexperienced operators.* Easy set-up for small run jobs.

Second to none.

Priced Under $350.00

MASSIVE, HEAVY HEAD and table to allow fast cuts without chatter.

Complete as Shown, Ready to Operate.

PRODUCTION MODEL

Exclusive 3-Way Travel

You can easily effect a 50% economy in the milling costs of small parts with this versatile machine.

Designed and built for holding close tolerances on big run jobs. Hundreds in use in large plants from coast to coast.

The "BUY"-WORD for small parts milling jobs is "BARKER MILLER."

WRITE FOR LITERATURE AND COMPLETE INFORMATION

BARKER ENGINEERING COMPANY

500 GREEN ROAD CLEVELAND 21, OHIO

5 Reasons for replacing the Spindle on your #5 BROWN & SHARPE SURFACE GRINDER with a Whitnon

Self adjusting . . . Powerful springs keep the bearings and shaft chatter-free regardless of wear or temperature change.

Grease lubricated. No oil of any kind required. Bearings and spindle are grease packed and sealed at assembly.

Fine finishes are assured . . . The spindle assembly is precision balanced on its own bearings. These ball bearings are the most accurate obtainable.

Completely interchangeable . . . This unit replaces the troublesome bronze bearing assembly on your present grinder.

Use your original pulley and wheel mount . . . No need to buy special attachments.

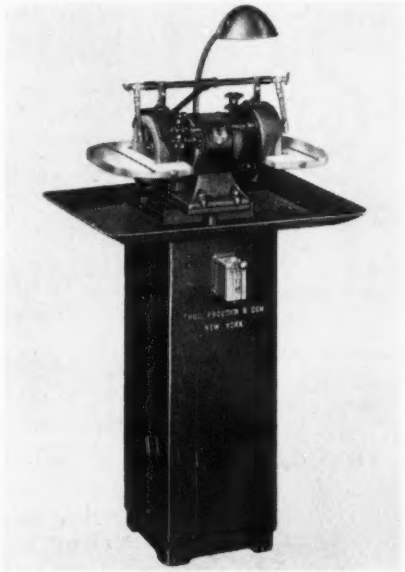
Write Today for Price and Delivery

The Whitnon MANUFACTURING CO.

217 High St. New Britain, Conn.

Carbide Grinder Is Designed for Wet Grinding Operations

Identified as the Model AW, a machine which is designed for the wet grinding of carbide has been announced by Thomas Prosser & Son, 120 Wall St., New York 5, N. Y. The Model AW is said to embody all the features of the company's Model AA machine, including quick-acting indexing tables which can be instantly and accurately set to the required angle. In addition, the Model AW is provided with



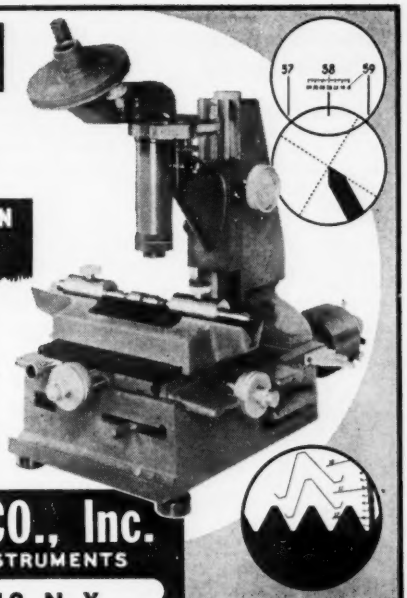
Prosser Model AW Wet Carbide Grinder

a separate motor-driven coolant pump, pan, settling tank, piping, valves, nozzles, and spray guards, and delivers a copious flow of water directly to the tool being ground. A drum-type on-off-reverse switch, combination protractor tool guide and truing tool holder, electric light, and brake are also provided on the Model AW.

The machine is furnished with a ½ h.p. motor for either 110-volt 60-cycle single-phase or 220/440-volt 60-cycle 3-phase current. All types of grinding wheels, diamond wheels, and accessories which are normally available for the Model AA machine are also available for the Model AW grinder.

NEW LEITZ
TOOLMAKER MICROSCOPE

...PRODUCES HIGHEST PRECISION
....CUTS INSPECTION TIME



The NEW LEITZ DESIGN checks angular measurements in degrees and minutes.

Contains all Thread Templates for U.S. National thread profiles 6-80 pitch.

Contains Radii Templates from 21/64" to 13/16" by 1/64". Concentric circles from .010" to .280" by .010" and one blank compartment.

NOTE: TEMPLATES CAN BE OBSERVED IN 3 MAGNIFICATIONS: 10X - 20X - 30X

BE SAFE — SEND FOR LATEST BULLETINS

GEORGE SCHERR CO., Inc.

COMPLETE LINE OF PRECISION INSTRUMENTS

198-A LAFAYETTE ST., N. Y. 12, N. Y.

SAWMASTER HACK SAW

6" x 7" capacity saw illustrated. 4" capacity at 45° angle.

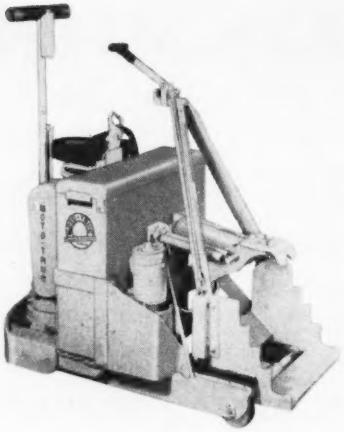
In every plant there is a large variety of uses for the SAWMASTER Hack Saw. Its *self-contained portability*, its *low cost*, and *rugged construction* to handle work in capacities of 6" x 6", 4" x 4", and 6" x 7" with 5 models make it an economical, accurate, efficient and versatile machine. Many superb features. All SAWMASTERS operate with efficient push-cut action.

Write for Bulletin 300.

MILLER-KNUTH MFG. CO. OMAHA, NEB.

Tractor Is Designed for Moving Trailers or Containers

Identified as the "Grip-All," a tractor which is designed for moving four-wheel trailers or containers has been announced by The Moto-Truc Co., 1979 E. 59th St., Cleveland 3, Ohio. The tractor incorporates an electric-hydraulic clamping mechanism which, it is claimed, can grip all types of trailers and hitches. The clamping and release mechanism is completely hydraulic. The lower "toothed" clamp can be adjusted in or out, depending on the position and height of the container or hitch, and the upper clamp comes down, completing the grip.

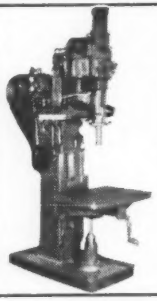


Moto-Truc "Grip-All" Tractor

The tractor is available with either a 12 or 18-volt battery, and overall dimensions are 27 inches wide x 48 inches long. The tractor is said to have a drawbar pull of approximately 700 lb., and a heavy-duty power-driven unit and roller-grip controls are utilized.

Air Control Valve Has Built-In Speed Controls

Valvair Corp., Akron, Ohio, has announced an air control valve which has two speed controls built into the valve body and which is designed to control the stroke of an air cylinder. Control assemblies to actuate the valve are a knob,



KAUFMAN TAPPING MACHINES

Kaufman *specializes* in tapping machines—every machine precision - built to meet the requirements of individual production jobs. Designed with fully automatic cycle, single or multiple spindle heads and other most advanced features. *Write for complete information.*

KAUFMAN MFG. CO.
Manitowoc, Wisconsin

A Real Spring Winder!

Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

No. 1 Capacity 0 thru 3/32" wire $1.50
No. 2 Capacity 0 thru 3/16" wire $3.00
No. 3 Capacity 0 thru 5/16" wire $5.00

HJORTH LATHE & TOOL CO.
10 BEACON STREET WOBURN, MASS.

BOSTON UNIVERSAL ANGLE PLATE

Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with vernier scale reading to 5 minutes.

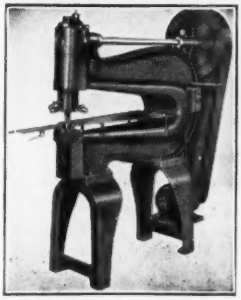
Puts Speed and Profit into Angular Drilling, Milling, Planing, Shaping, Grinding

With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

Made in several stock sizes. Write today for full information.

US AUTOMATIC BOX MACHINERY CO., Inc. **10 ARBORETUM RD. BOSTON 31, MASS.**

SAVAGE
NIBBLING MACHINES



CAPACITIES UP TO 3/4"

—

ASK FOR FREE BULLETIN "I"

—

"NIBBLE YOUR COSTS"

FOR TUBE SLOTTING, TUBE SHAPING AND CUTTING FLAT SHEETS BY TEMPLATE OR TO A SCRIBED LINE.

W. J. SAVAGE COMPANY

Knoxville *Since 1885* Tennessee

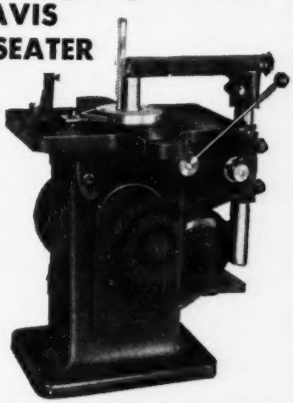
PIONEER MFRS. OF NIBBLING MACHINES

Why Use A Shaper
to cut Keyways when a DAVIS KEYSEATER

will do the job so much quicker and better?

•

Send for Circular

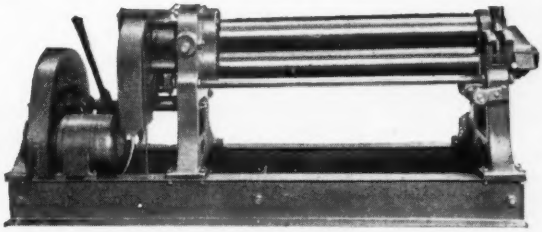


DAVIS KEYSEATER CO.

Exchange and Glasgow Sts.
ROCHESTER, N. Y.

Beloit INITIAL TYPE BENDING ROLLS

Wherever sheets and plates must be formed into cylindrical shapes, the Beloit Bending Roll meets all requirements for quick and efficient operation. Expertly designed for years of excellent service. Easy to operate. Rolls are of slip type. Hinged housings provide for fast removal of completed cylinders. Reversing lever places equipment in readiness for the next work piece.



Get all the facts on why Beloit equipment turns out the work easier and faster.

Write for Catalog No. 14-E.

HENDLEY & WHITTEMORE CO.

110 BLACKHAWK BLVD. • BELOIT, WISCONSIN

Builders of Punches, Shears and Bending Rolls Since 1900

MODEL JA
50,000 R.P.M.
Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

$42 IN U.S.A.

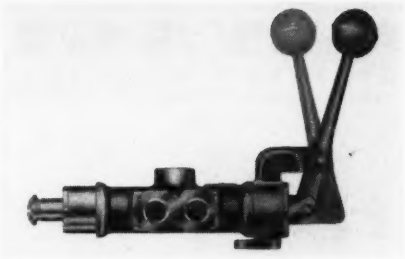
THEY GRIND—NOT JUST RUB!

The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind . . . not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work . . . longer wheel life.

MADISON-KIPP CORP.
208 Waubesa St., Madison, Wis., U.S.A.

Write for KIPP Air Tool Catalog at 3006



Valvair Two-Speed Air Control Valve

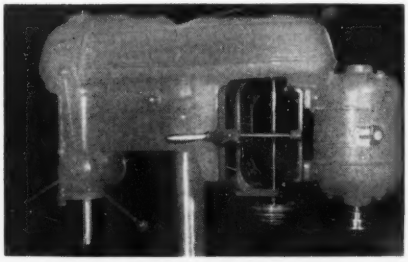
lever, clevis, treadle, foot, cam, cylinder, solenoid, and diaphragm. The valve is available in a standard 4-way piped exhaust model in the ⅜-inch pipe size.

Speed Change Mechanism Fits Any 17 to 20-Inch Drill Press

Designated as the "Vari-speed Changer," a speed change mechanism which is designed to fit any 17 to 20-inch drill press, enabling the operator to change speeds simply by releasing a toggle-action lever and slipping the belt to the proper pulley step, has been announced by Boyd Machine, Inc., 711 E. Fourth St., Royal Oak, Mich. According to the manufacturer, the unit allows for speed changes of from 125 to 4,000 r.p.m. with a 1,725 r.p.m. motor.

Made of heavy cast iron, the speed changer is shipped in one unit and utilizes the belt supplied with the drill press. The unit, it is claimed, does not interfere with the belt guard and is furnished with pulleys and a second belt.

Boyd "Vari-speed Changer" installed on drill press



STEEL
Stanho
PRODUCTS

the Quality Line

- WOODRUFF KEYS
- MACHINE KEYS
- MACHINE RACK
- TAPER PINS
- COTTER PINS
- SPECIAL PARTS

and other Stanho products
Bulk or Packaged

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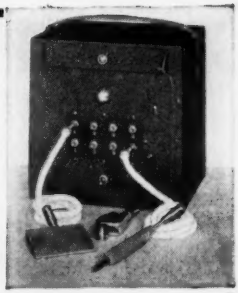
JM3

STANDARD
Since 1872 HORSE NAIL CORP.
NEW BRIGHTON, PA

MARK
IRON,
STEEL
and
CARBIDES



THE Etchograph WAY

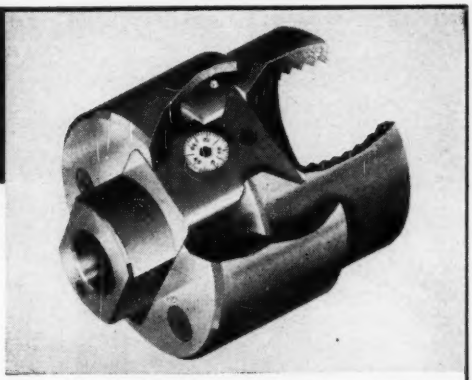
Original Electric Etcher, Thousands In Daily Use

Mark *hardened parts*, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides — quickly — plainly. • Three sizes to meet all requirements.

• *Write for circulars and prices.*

BREWSTER-SQUIRES CO.
P. O. Box 191 Tenafly, N. J.

SAMSON
Offset
BORING CHUCKS



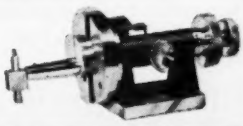
THESE JOB-PROVEN FEATURES WILL SAVE YOU TIME AND MONEY

- *Quick tool change*
- *Positive dead-centering*
- *Precision offset adjustment*
- *Rugged tool support*
- *Safety round contour*

Complete Boring Chuck Accessories Available

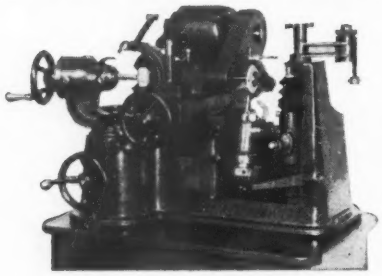
WRITE FOR COMPLETE DETAILS

Manufacturers of
FAMOUS
LAST WORD
WHEEL
DRESSER

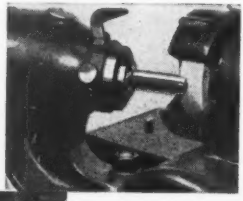


LAST WORD SALES CO. • 18500 Mt. Elliott • Detroit 34, Mich.

HYBCO
TAP GRINDER



MODEL 1100



• Capacities No. 0 Machine Screw to 1½" Hand Taps.

Henry P. Boggis & Co.

708 East 163rd Street
Cleveland 10, Ohio

Machine Grinds Buckets and Blades for Aircraft Gas Turbines

A generating belt grinder which is designed for grinding buckets and blades for aircraft gas turbines has been developed by Planet Products Corp., Cincinnati, Ohio. The design of the machine is said to incorporate a new approach to conjugate form grinding using an abrasive belt traveling between a master form and the workpiece. The master form generates the desired contour as a result of the specific relative motion between it and the workpiece. According to the manufacturer, this motion is such that progressive contact of limited area results, and a 15-h.p. motor supplies ample power for rapid metal removal.

Planet Model 4T Generating Belt Grinder

The machine is available in two basic models; namely, the Model 4S for concave shapes and the Model 4T for grinding convex and relatively flat surfaces. Reciprocation of the workpiece on Model 4T and of the cam assembly of Model 4S is hydraulic, and pressure is said to be automatically reduced when the machines are not grinding. Although the components of the grinding units are similar in the two models, the Model 4T

Use *Anderson* BALANCING WAYS

No Leveling Required

With Anderson Balancing Ways it is easy to balance any rotating object in a fraction of the time formerly required by other methods. Simply place the Ways on the floor or bench and they are ready to use without adjustments of any kind.

The revolving, chilled iron discs and the spindles, are ground and balanced to extreme accuracy. Spindle bushings are hardened—glass hard—yet without danger of breaking. This eliminates the possibility of wear or ball bearing indentations on spindles or bushings when heavy weights are placed on the ways.

They save time, save labor, and assure better work.

Swing	Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

ROCKFORD Anderson BROS. MFG. CO. ILLINOIS

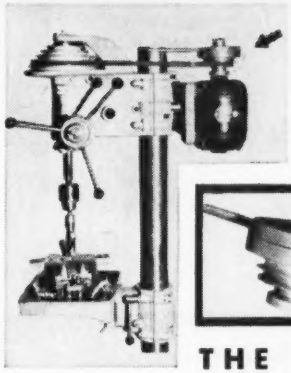
Write for Bulletin 5-22

ANDERSON BROS. MFG. CO., Rockford, Ill.

Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses.

New "PULL-GEAR" SPEED-REDUCING PULLEY Increases Drill Press Capacity

Made In
3 Motor Shaft Sizes
½" • ⅝" • ¾"



Amazing new internally geared speed reducer doubles drill press capacity. Greater power, greater efficiency, greater productivity.

Provides the correct speed and power for larger drilling, reaming, tapping and boring on light presses. Easily installed in five minutes. Adaptable to all type machines. Spindle speed range approx. 45 to 2000 RPM. Write for literature.

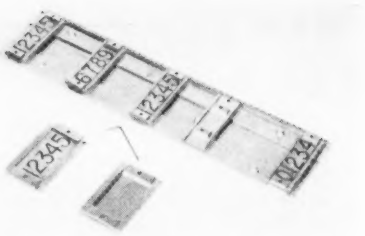
Some Territories Open to Jobbers

THE PULL-GEAR CO.

4118 E. 8-Mile Rd. • Detroit 34, Michigan

WRITE FOR LITERATURE

is said to be more versatile. A variety of forms ranging from relatively flat shapes (with waviness concave as well as convex) to extremely convex forms, it is claimed, can be generated on the Model 4T. In the Model 4S machine for concave grinding, the work-holding fixture is mounted on the feed arm. The sweep unit of the concave machine imparts what is basically an oscillating planetary motion to the master form. Push-button controls are mounted directly on an electrical panel enclosure at the front of each machine, and wiring is in accordance with J.I.C. standards.



New Hermes Sectional Copy-Holding Slide

Sectional Copy-Holder Slide Is Designed for Engraving Letters and Numerals at Right Angles

A sectional copy-holding slide which is said to save time in the engraving of letters and numerals at right angles has been announced by New Hermes Engraving Machine Corp., 13-19 University Place, New York 3, N. Y. Designed to eliminate realignment of work and to permit horizontal engraving in one continuous operation, the brass copy holder is said to save space on the job by allowing the engraving of more characters per line.

According to the manufacturer, the holder is particularly ideal in marking long bands, such as terminal strips. The device may be used on any model Engravograph with standard $\frac{5}{8}$ or $1\frac{1}{4}$-inch blanks.

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Straight Shank

HIGH SPEED DRILLS

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12" LONG . . . 9" CUTTING FLUTE

Size	Net	Size	Net	Size	Net
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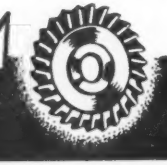
9/64	1.65	5/16	2.25	31/64	3.60
5/32	1.65	21/64	2.50	1/2	3.60
11/64	1.65	11/32	2.50	17/32	4.00
3/16	1.65	23/64	2.75	9/16	4.25
13/64	1.80	3/8	2.75	19/32	4.50
7/32	1.80	25/64	3.05	5/8	4.80
15/64	1.95	13/32	3.05	21/32	5.20
1/4	1.95	27/64	3.30	11/16	5.60
17/64	2.05	7/16	3.30	23/32	6.00
9/32	2.05	29/64	3.60	3/4	6.50



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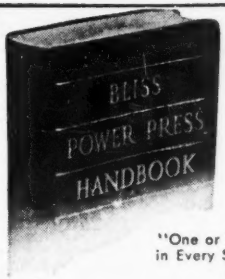

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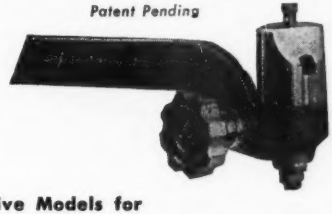

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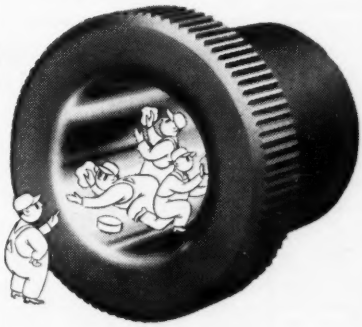
reduces tool wear to a minimum

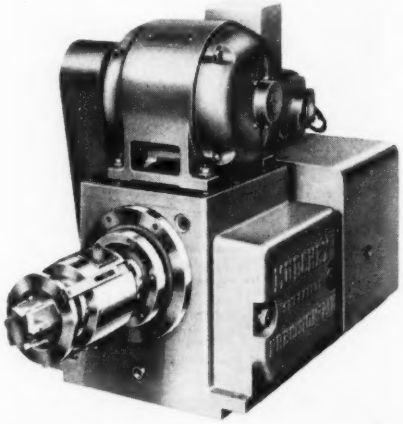


One sure way to cut excessive tool wear in your operations is to specify Universal Drill Bushings because their superfinish bores help reduce wear on production tools to an absolute minimum, especially in close tolerance work. The blended radius on the top inside diameter helps prevent tool hang-up and breakage. 100% concentricity and hardness tests insure accuracy, uniform high quality and long life. Knurled heads provide a quick, sure grip. Universal Drill Bushings are produced in a complete range of standard sizes and lengths. Orders for special dimensions will receive prompt attention. For complete information, write to the office nearest you—Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.—or our home office.

UNIVERSAL ENGINEERING COMPANY
Frankenmuth 9, Michigan
171-B

Threading Unit Has Direct Precision Lead and Rapid Return of Tool Spindle

Designated as the Murchey "Precision-Pak," a compact, rugged, self-contained threading unit which has direct precision lead, rapid return of the tool spindle, variable speeds, and flexibility of application has been announced by The Sheffield Corp., Dayton 1, Ohio. The unit incorporates a hardened and ground spindle driven by a 3-h.p. motor. Precision lead is said to be maintained throughout the entire feed travel of 4 inches by a hardened and ground quick-change lead screw and collapsible lead nut head which is mounted directly on the rear end of the spindle. At the end of feed travel, lead nuts are automatically disengaged and rapid spindle return is obtained through a planetary gear clutch incorporated in the unit.



Murchey "Precision-Pak" Threading Unit

The unit is said to be adaptable for mounting in most any position, such as horizontal, vertical, or angular, in single, double end, or multiples. Used in conjunction with Murchey collapsible taps and self-opening die heads, the unit is claimed to be ideally suited for a variety of high production precision threading applications.

M-D Facing Heads

With Automatic Feed

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse; feeds automatically. Sizes 6" to 46" diameter.

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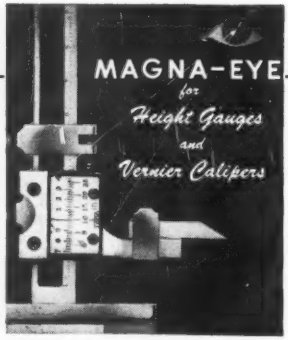

MAGNIFIES the "hard to read" vernier scales on calipers and height gages. No more eye strain, guess work or hit or miss setting and reading. LENS is finest quality optical glass, specially designed and ground for the purpose wth utmost optical skill. 4X magnification shows lines true and correct. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many others engaged in defense work.

Made in 3 sizes to fit Starrett, Brown & Sharpe, Lufkin Tools, and others of similar design. S No. 100 for 6" Vernier Calipers; S No. 200 for 10"-12" Height Gages, also 10"-18"-24" Vernier Calipers; S No. 300 for most popular type 18" and 24" Height Gages and for 36"-48" and 60" Calipers.

For Complete Information Write, Phone or Wire

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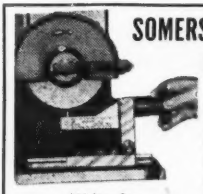

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Exclusive vise grip jaw runs full length of cutting channel... hugs bit so it can't rock, chatter, slip, sag or break... *permits faster feed, deeper cuts!* Holds all sizes—square, round, undersize or narrow bits for cutting off or special forming operations.

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Simple, Fast, Sure! Just drill the hole, insert the pin. Three longitudinal grooves expand the pin. It re-forms to shape of hole when inserted. GILLEN GROOVE PINS hold tight; yet they remove without damage to holes. GILLEN PINS improve assembled appearance. Millions are used by industry to do a better job at lower cost. Investigate GILLEN GROOVE PINS for your production line.

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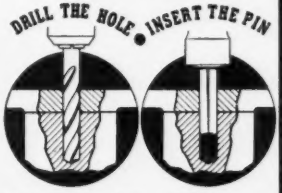

Put 'em together... FAST
Speed assembly time uniting fixed or moveable members. Five types of GILLEN PINS meet nearly every fastening requirement.

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GILLEN GROOVE PINS fit tight at every point of hole circumference, making safe, positive anchorage, not affected by vibration or shock.

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For replacement or repair, simply tap out the GILLEN PIN; re-use it. B-1112 and C-1010 zinc plated steel used. Also available in other metals, or plated to specifications.

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TRY FREE SAMPLE PINS
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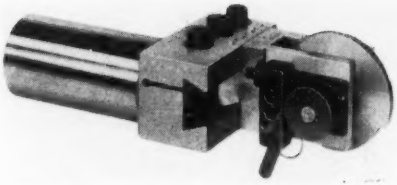
2542 S. 50th Ave., Cicero 50, Ill.

Automatic Marking Device Is Suitable for Light and Heavy Work on Screw Machines

Designated as the Model 600-E, a marking device for screw machines that is said to permit die marking of part numbers, patent numbers, trade marks, and so on, on the end face of parts during the machine cycle has been added to its line of automatic roll markers by New Method Steel Stamps, Inc., 149 Joseph Campau, Detroit 7, Mich. Suitable for both light and heavy work on automatic and hand-operated screw machines, bench and turret lathes, and other machines, the marker, it is claimed, is useful for marking end face of parts on any diameter of face from 1½ inches up. Easy disassembly of the unit for rapid interchange of lettering rolls is said to be possible by removing two conveniently placed Allen-head cap screws, the entire control mechanism and roll die shaft coming off as a single unit.



New Method Model 600-E Automatic Roll Marker

Other features of the marker include heavy dovetailed ways in the holder head which permit transverse adjustment of the roll die holder for the selection of marking diameter; and accurate, machined scale on the marker head for quick setting of the desired marking diameter; a heavy-duty shank which is said to maintain marker alignment and ensure uniform marking impression; and a ratchet lock which holds the die in a cleared position, minimizing scoring or dragging on parts at the end of the marking operation.

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CHECK THIS
CATALOG!
Here's a wealth of gear information condensed into a 20-page, amply illustrated catalog—"EARLE GEARS."
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• Two double rows of quality bearings in the large and small ends of the nose of this live center are your assurance of perfect alignment on any type of work.

Two shank sizes provide diameters from ½" to 7½" for a wide range of work with a single center.

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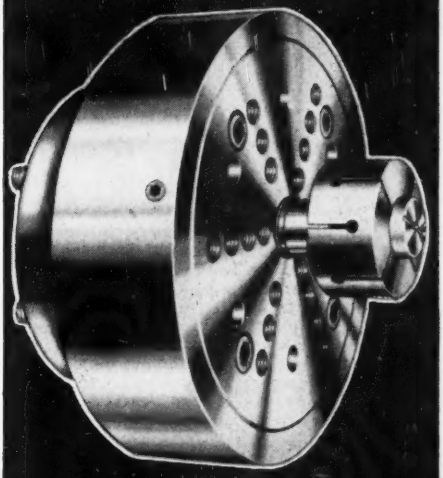

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Speedgrip Precision Internal Chucks will save you money on second operation work.

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T-Slot and Dovetail Cutters *by* Reltool!

● Reltool T-Slot Cutters, both straight and taper shank, have staggered teeth and undercut with side chip clearance. Greater chip room results in freer cutting action, reduces breakage.

● Reltool Shank Type Dovetail Cutters for use in Reltool End Mill Holders take the place of arbor type and threaded hole angle cutters. Reduced set-up time and easier handling mean greater efficiency in milling dovetails.

The RELTOOL Line Includes: Combined Drill and Countersinks • Cut-off Blades • Die Sinking Cutters • Dovetail Cutters • End Mills • End Mill Holders • Hollow Mills • Key Seat Cutters • Lathe Centers • Lathe Mandrels • Machine Countersinks • Metal Slitting Saws • Milling Cutters — all types • Screw Slotters • Tool Bits • Specials.

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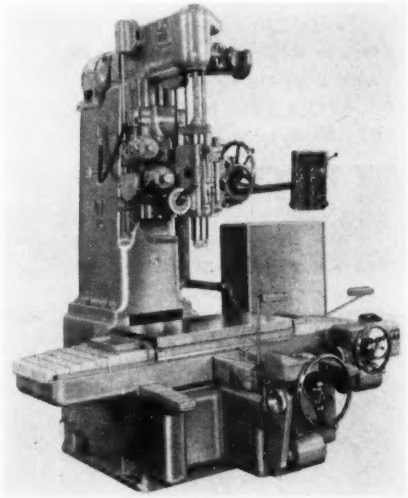
RELIABLE METAL CUTTING TOOLS
4540 W. BURNHAM ST. • MILWAUKEE 46, WIS.

A 7448-½

Jig Borer Is Capable of Locating and Machining to Tenths

Designated as the No. 2E, a jig borer which is designed for precision boring and milling operations and which features the Electrolimit measuring system and a preloaded ball roll quill, making it capable of locating and machining to tenths, has been announced by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn. The machine employs two separate Electrolimit measuring units, one for longitudinal and the other for transverse movements, both of which



P&W "Electrolimit" No. 2E Jig Borer

are said to be independent of traversing screws. Each unit obtains basic 1-inch spacings electromagnetically from a solid notched master bar and registers a zero reading on an indicating meter without making physical contact. Fractional inches are obtained by moving a small electromagnetic head by means of a precision micrometer head which is graduated for easy reading to 0.0001 inch.

According to the manufacturer, the preloaded ball roll quill is hardened, precision ground, and draw lapped. Operation of the head assembly vertically is controlled by push buttons, and an automatic interlocking mechanism clamps the head positively in position on the column after motion and releases it be-

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Threaded Plastic Balls
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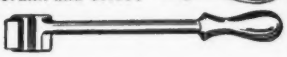
Clamping Handles

Cast Iron Hand Knobs, Three Styles

Machine Handles
Straight, Crank and Offset



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- For every kind of marking
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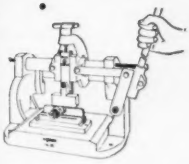

The ACROMARK SERIES 9A Machine shown at left will mark anything you make.

- It's lowest in price and highest in quality. It comes in hand, motor and air driven models.

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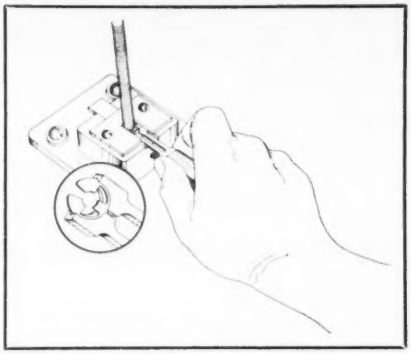
1342 W. Vernor Highway Detroit 1, Michigan

fore motion starts. The jig borer has electronically-controlled milling feeds which, it is claimed, are infinitely variable from 1 to 15 inches per minute. Rapid power travel of 60 inches per minute is also said to be provided. Eight selective spindle feeds ranging from 0.0005 inch to 0.015 inch per revolution (both up and down) are incorporated in the machine, and 12 spindle speeds ranging from 37 to 1,800 r.p.m. are provided through a gearbox and 4-speed motor. Table travel is 36 inches longitudinally and 22 inches transversely, and the maximum distance between the table and spindle end is 27 inches. Special columns 6 or 10 inches higher than standard can be furnished.

Dispenser Speeds Assembly of Truarc E-Rings

To accommodate mass production assembly requirements, Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N. Y., has introduced a Truarc Dispenser which is said to make possible faster, more effective handling and assembly of Waldes Series 5133 Truarc E-Retaining Rings. The dispenser unit consists of a machined, weighted base that can be secured to the top of a bench or assembly table. Truarc E-Rings are supplied stacked on rods (in sizes 9 through 50) which fit into the base of the dispenser. The rod is locked in position and the rings line up ready for extraction, one at a time, with a Truarc applicator. No further adjustments are necessary.



Line drawing showing the Waldes Truarc Dispenser in use

starting from scratch
WITH MARSHALL PRECISION GROUND FLAT STOCK
The world's largest range of sizes of precision ground tool steel in three grades are available, ready for immediate shipment and the layout bench.
★ WATERcrat: A fine grained electric furnace high carbon tool steel. It has been wet ground to remove all bad surfaces and to assure velvet finish of virgin metal.
★ OILcrat: An outstanding product of careful handling assures you of a fine grained electric furnace oil hardening ground flat stock ready for the layout bench.
★ AIRcrat: This air-hardening tool steel shows less size change and offers a greater safety in hardening than either of the other grades. Box 108MM.
Write for descriptive literature, catalog of sizes and prices.
MARSHALL STEEL CO.
LA GRANGE, ILLINOIS
The Aristocrats of Ground Tool Steel

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CUTS THE COST OF STAMPING NUMBERS

Model 70

Multi-Wheel Numbering Machine

Machine and Shank All One Piece.

The most efficient method of stamping numbers into metal. Repeats the same numbers until changed. Model 70 NUMBERALL Machines are used in all industries to mark various parts. Stamps numbers, etc., quickly . . . neatly. Perfectly aligned. Much better marks are produced by these machines than by single stamps or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from 3 to 20.

Write for Bulletin MS-70.

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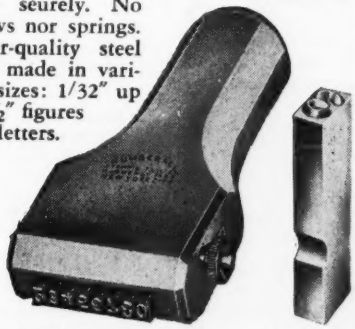
Hand or Press style. Type can be easily, quickly loaded and unloaded. Simplest construction . . . Just a sturdy pin holds the type seurely. No screws nor springs. Super-quality steel type made in various sizes: 1/32" up to ½" figures and letters.



Write for Bulletin MS23H

Steel Type

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HUGUENOT PARK STATEN ISLAND 12, N. Y.

read what users say

about CMD anti-scoring lubricant

Among technical men all over the country, CMD has become the standard for extreme pressure, anti-scoring lubrication. These men have found that they can get more efficient lubrication for a longer time . . . and get longer life out of their equipment too. People who have used and tested CMD are your best proof of its reliability.

"We have tried out your CMD Anti-Scoring lubricants in both grease and oil in comparison with another brand claiming to be the world's best, for the purpose. We are happy to report that we have found your product superior in remaining in its protective position under sustained heavy loads for the longest periods of time of any material we have tried for this purpose."

Engineering Consultant

"Some time ago you very kindly sent to us some samples of your CMD Center Point Lubricants. These have been carefully tested in a number of applications besides the lubricating of centers, and we are pleased to say that the results have been very satisfactory even in cases where other well known high pressure lubricants have failed in a very short time."

University Dept. of Physics

Sample Kit Available for Your Trial

CHICAGO MANUFACTURING & DISTRIBUTING CO.

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As a ring is extracted, an actuating slide immediately feeds a new ring into position. The Truarc dispenser, it is claimed, permits the assembler to maintain a continuous, uninterrupted, and untiring operation from dispenser to assembly.

Needle Bearing Bushing Seals Against Dirt, Coolants, and Grit

J. G. Jergens Co., 11106 Avon Ave., Cleveland 5, Ohio, has announced a needle bearing pilot bushing which is said to provide an absolute seal against dirt, coolants, and grit entering the bearing cavity. According to the manufacturer, the effectiveness of the needle bushing seal is actually increased as dirt, coolants, and grit enter the outer seal. The needle bushing, it is claimed, can be disassembled without removing the housing and protects against thrust loads, as well as radial loads. The overall length of the bushing provides maximum bar support and is adaptable to keys or keyways. The bushing is available in a wide variety of sizes.

Jergens Needle Bearing Pilot Bushing

ACCO products
CAMPBELL Abrasive Cutters
New... Low Cost
No. 223 Wet Abrasive Cutting Machine
Fast, clean, close tolerance cuts of hardest alloys and all other metals. Won't work-harden material.
FEATURES
1 Wheel Guides for more accurate cuts ... reduces wheel flutter
2 Separate Coolant Tank ... large capacity ... may be easily removed for cleaning
3 Five Inch Wheel Flange for wheel economy
4 Automatic Work Stop
5 Automatic Coolant Pump Operation
6 Instantaneous Electro-Hydraulic Automatic Work Clamp
Write for Principles of Abrasive Cutting
ACCO
TRADE MARK
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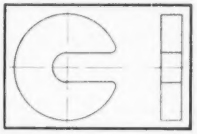
931 Connecticut Ave., Bridgeport, Conn.
CAMPBELL
Abrasive Cutters and Nibblers

Heavy-Duty C-Washer

Reid Tool Supply Co., 709 Baker St., Muskegon Heights, Mich., has announced a heavy-duty C-washer which is available in nine sizes for use with bolts and studs ranging from ¼ to 1 inch in diameter. The washer is made of low-carbon steel and is case hardened. All sharp edges are removed, and surfaces are said to be flat and parallel. The washer is zinc plated for appearance.



Reid Heavy-Duty C-Washer

READING BENCH KEYSEATER

Portable—move directly to job; a time saver for both small and large shops.

3¾" stroke; adaptable for other work.

Low first cost — prompt delivery.

Good dealers wanted.

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CAMS

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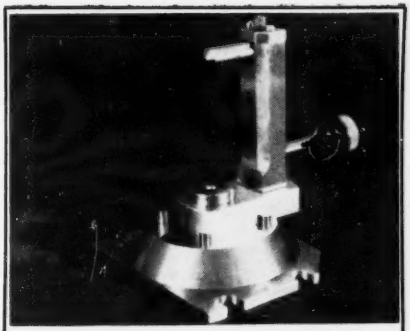
BLOOMFIELD TOOL CORPORATION
37 Farrand St. Bloomfield, N. J.



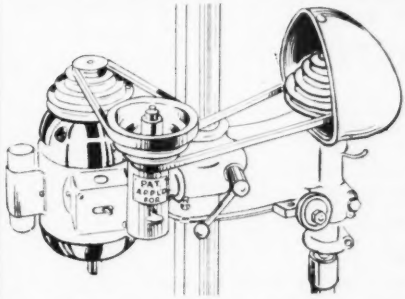
accurate • rugged • compact

RADIX WHEEL DRESSER

Featuring: accuracy held to .0001 radius tolerance. When dressing radii on surface, external or internal grinders up to 8" wheel. Holds diamonds from 3/16" to ½" diameter, 1⅛" male or 2" female radius. Holder can be stopped at any radius point, with positive stops at 90 and 180 degrees. Hardened, ground and lapped tool steel. Base 4" x 5", height 5½". A sturdy, rugged unit for precision service. Write for details and prices. Dealer inquiries invited.

CLEVELAND RADIX TOOL CO.
1025 Broadway • Cleveland 15, Ohio

SPEED REDUCER (ALMOST 1 - 10)



for Drill Presses

(DELTA-WALKER TURNER, ETC.)

SPEEDS DOWN TO 175 R.P.M.

FEATURES

• Allows drill head to move freely up and down. • Speed changes take less than a minute. • Fits almost any standard motor base up to ¾ HP. • Reduces spindle speed from 1725 RPM to as low as 175 RPM WHILE IN OPERATION.

Easy to install, the Newman Speed Reducer is a multiple-speed attachment which is valuable wherever drilling, tapping, and reaming are done. It changes multiple drill presses into production machines. For instance, if you need to drill and tap small holes in 100 or more pieces, a two spindle drill press equipped with our speed reducers will complete the drill and tap operations in about half the time.

A four spindle drill press equipped with Newman Speed Reducers will make holes ½" or ¾" without any need to change drills. Time saved again!

PRICE ONLY $35.00

F.O.B. Springfield, Mass.

Write direct if distributor cannot supply you

LOUIS NEWMAN MACHINERY CO.

8 - 10 STEARNS SQUARE • SPRINGFIELD, MASS.

Air-Mite Micro Model Cylinder

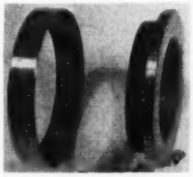
Small-Size Air Cylinder

Designated as the Micro Model, a small-size air cylinder which has a 1-inch stroke and which is said to be ideal for use in small jigs and fixtures where size and space limitations are primary factors has been announced by Air-Mite, 4417-H W. Carroll Ave., Chicago 24, Ill. According to the manufacturer, the cylinder is capable of delivering a 75-lb. thrust on a 100-lb. line pressure, and equal ram pressure is provided at any stroke point.

The cylinder is machined from solid brass bar stock to minimize the possibility of rusting or pitting of the cylinder wall. Any number of cylinders can be operated by a single control valve.

Spacing Collar

Dayton Rogers Mfg. Co., 2824 13th Ave., S., Minneapolis 7, Minn., has announced that its micrometer adjustable spacing collar for milling machine cutter arbors is now made of a new



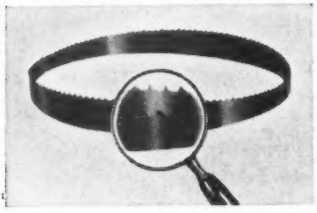
Dayton Rogers Hardened Alloy Steel Micrometer Adjustable Spacing Collar

hardened steel alloy which, according to the manufacturer, provides for greater accuracy of the micrometer threads than heretofore.

The alloy is also said to allow the operator to clamp or tighten the milling machine nut arbor up to a given pressure of 20 tons without disturbing the micrometer accuracy of the cutter arbor adjustable spacers when used in gang milling and other such milling machine operations.

BARNES HACK SAWS — BAND SAWS BARNES

BARNES WELDED BAND SAWS ARE SUPERIOR!



Barnes Band Saws are available 3 ways: Welded Bands, Arc Line 100-foot Coils, Random Economy Coils.

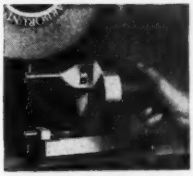
LOOK AT THESE BARNES Features...

- Special equipment assures perfect welds.
- Controlled anneal provides flexibility and strength.
- Consistent quality—rigid inspection.
- Tailor-made to exact length—NO SCRAP.
- Prompt delivery from local Distributor's stock.

DETROIT BARNES U.S.A.

W. O. BARNES CO., INC.
1288 TERMINAL AVE., DETROIT 12, MICH.

TALLMAN



RADIUS EMERY WHEEL DRESSERS

To dress a .250" concave radius raise diamond holder .250" above center. Lower diamond holder .250" below center for .250" convex radius. Pass diamond across face of wheel by rotating spindle with hand wheel, running wheel away from spindle. Concave radii dressed up to 2½". Convex radii dressed up to 1⅜".

WRITE FOR FOLDER.

Also manufacturers of clamping blocks and drilling plates.

TALLMAN TOOL & MACHINE CORP.

ROCHESTER • NEW YORK

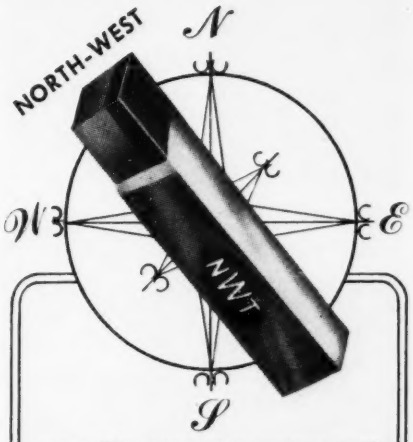
USE ECONOMY

Headless Set Screws — **Socket Set Screws**

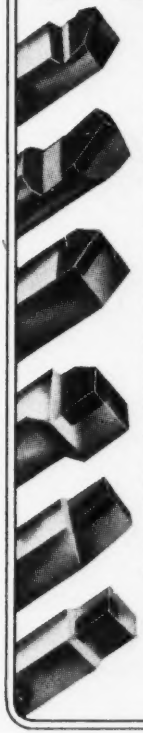
Try Them On Your Next Job!

ECONOMY MACHINE PRODUCTS COMPANY

5212 Lawrence Ave., Chicago 30, Ill.



GO "NORTH-WEST"



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Next time you start out to purchase the best in carbide tools, chart your course to "North-West."

Full-size tips, uniformly brazed, have diamond ground cutting edges. "North-West" tools are tipped with Carboloy cemented Carbide.

Many of your requirements can be met by altering standard tools from stock!

Precision built flat, single point, carbide cutting tools.

Carbide cutting tools made to your own specifications.

A complete line of Standard Carbide cutting, turning and boring tools. Available immediately from stock.

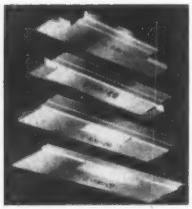
Distributors in all leading cities.

Write for catalog.

THE NORTH-WEST TOOL COMPANY

8 North Kilmer St.

Dayton 7, Ohio



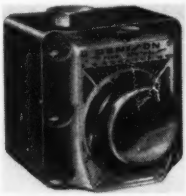
OK Centerless Grinder Work Rest Blades and Guides

Work Rest Blades and Guides

The Ohio Knife Co., Dept. 29, Dreman Ave., Cincinnati 23, Ohio, has announced the availability of a complete line of centerless grinder work rest blades and guides. According to the manufacturer, the blades are made of heat-treated high-speed steel and provide high finishes and close tolerances. Blades of inserted-carbide, cast alloys, or iron are also available. In addition to standard sizes, blades with special contours, angles, or shapes can be supplied to specification.

Valve Meters and Controls Oil Flow

Designed for metering or controlling the oil flow in hydraulic systems, a multi-range flow control valve for operating pressures up to 3,000 p.s.i. has been announced by The Denison



Denison Multi-Range Flow Control Valve

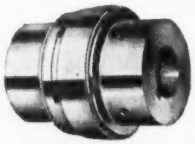
Engineering Co., 1160 Dublin Rd., Columbus 16, Ohio. The valve is said to be of the pressure compensating type; therefore, oil flow can be maintained at a uniform rate regardless of circuit pressure variation, ensuring smooth operation and minimizing erratic motion. The valve features a two-way adjustable orifice, and the width of the orifice can also be varied by turning the entire control stem upward or downward. A knurled dial adjustment locking screw limits each range of control.

LOVEJOY
Power Transmission Equipment

Long Dependable Service

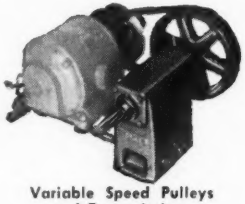
Operating Economy

Efficient Production Control



Flexible Couplings

LOVEJOY FLEXIBLE COUPLINGS. Provide positive protection against vibration, torque, and shock of intermittent loads. Cushions changed without shutdown. No lubrication required. Every duty from 1/6 to 2500 hp.



Variable Speed Pulleys and Transmissions

LOVEJOY VARIABLE SPEED PULLEYS. Change instantly to any speed required—while machine is running. Ratios to 3 to 1. Fractional to 8 hp.

LOVEJOY SELECT-O-SPEED TRANSMISSION: Finger-tip control for instant adjustment over wide range of speeds. Hand wheel or lever control. Ratios to 10 to 1. Fractional to 7½ hp.

Universal Joints

LOVEJOY UNIVERSAL JOINTS: Finest alloy steel. Precision ground. No binding, backlash, or pin inplay. 13 sizes. Bores ¼ to 2 in. Lengths 2 to 10⅝ in.

Send for catalog and engineering data

LOVEJOY FLEXIBLE COUPLING CO.

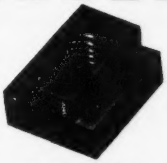
5007 W. Lake St., Chicago 44, Illinois

BREMIL

The IMPROVED Compound Lever Shears

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to ¼" steel plate.

BREMIL MFG. CO.
1400 Pittsburgh Ave., Erie, Pa.



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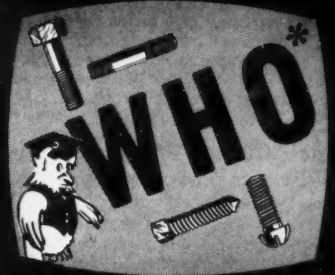
STUD SETS

STRAP CLAMPS

SURE GRIP STEP BLOCKS

TIETZMANN TOOL CORP.

ENGLEWOOD, OHIO



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COUPLING BOLTS • CAP SCREWS

MILLED STUDS • SET SCREWS

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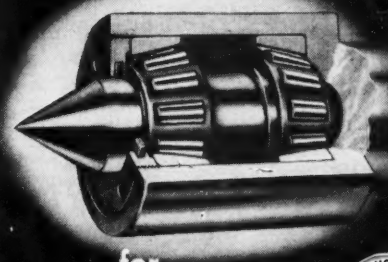


Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.

for lathe and grinder tail stocks

FREE BULLETIN 105
"What you should know about LIVE CENTERS"

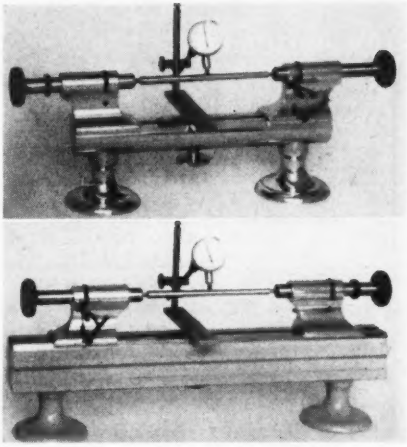
FALLS PRODUCTS, INC., 124 Genoa Street, GENOA, ILL., U.S.A.

The valve is offered in 2 and 3-port types in ¼, ⅜, and ¾-inch sizes for subplate mounting. The unit is also available with or without built-in checks. The multi-range flow control can be employed in meter-in, bleed-off, or other standard circuits used in a work cycle.

Bench Center Provides Accurate Holding for Inspection Purposes

Fearless Tool Co., 7045 Darby Ave., Reseda, Calif., has announced a bench center which is designed to provide an accurate holding means for inspection purposes. The center has a capacity for accommodating work up to 3¼ inches in diameter. The instrument is available in two models; namely, the Model A which has a 12-inch bed and 8-inch maximum center distance, and the Model B with an 18-inch bed and 14-inch maximum center distance. Each model is supplied with an adjustable indicator support accommodating a 0.001, 0.0005, or 0.0001-inch dial indicator.

The center is made with collet-type center holders so that internal and external centers and other special fixtures may be used between the quill heads. Either lever-action or direct-action quills are available. The Model A can be furnished with either a single or double pedestal; the Model B is supplied with a double pedestal only.



(Above) Fearless Model A Bench Center.
(Below) Fearless Model B Bench Center

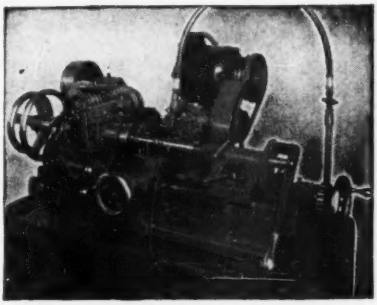
Sharpens metal saws in gangs milling cutters, too!

Sharpens saws from 2" to 8" in diameter in gangs up to 3¾" thick. Automatically indexes a gang of saws, one row of teeth at a time, and sharpens them with accuracy of ± .001" for entire lot. Salvages milling cutters and saws that might otherwise be scrapped. Write for literature on 57 T automatic grinder.

WARDWELL
Maker of largest line of saw and tool sharpening machines

THE WARDWELL MFG. CO., 3166 Fulton Rd., Cleveland 9, Ohio.

WALTHAM



THREAD MILLING MACHINE

Also Pinion and Gear Cutting Machines, Cylindrical Sub-Presses, Cutter Sharpening Machines, Small Special Machinery. Cutters for thread milling and gear cutting.

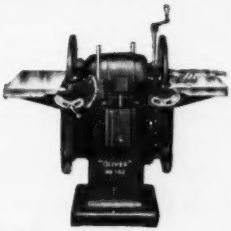
Write for illustrated bulletin.

WALTHAM MACHINE WORKS

WALTHAM MASS.

"OLIVER" 20-inch Double Disc GRINDER

Used in aircraft, defense and metal working plants for rapid grinding of plastics, aluminum, non-ferrous metals



The two tables 25" x 12" tilt down 45°, up 15°. One table has 4" vertical adjustment. Accurately grinds segments, circles and duplicating work. A fast, efficient production machine. Write for Bulletin No. 382-DD.

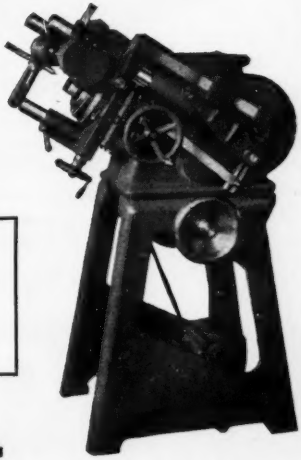
OLIVER MACHINERY COMPANY

GRAND RAPIDS 2, MICH.

Punches Shaped from the SOLID with OTTMANN Punch Shaper

FEATURES:

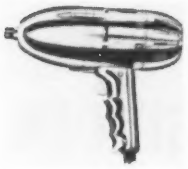
1. No holder plates required.
2. Simple work mounting.
3. No re-setting — Work can be adjusted to any position of tool.
4. Forms shaped accurate. Parallel and true.
5. Minimum hand work.
6. Convenient, simple operation. Uses standard shaping tools.



Write for Literature

CEDAR-WEST TOOL CO., INC.

90 WEST ST. NEW YORK 6, N. Y.



Syntron Electric Impact Tool

Impact Tool

An electric impact tool announced by Syntron Co., 309 Lexington Ave., Homer City, Pa., is said to provide a fast, easy method for running and removing up to 5/8-inch bolts. It is claimed to afford an excellent tapping and threading medium. In addition, the tool can be used for ordinary drilling, reaming, screw driving or drawing, hole sawing, wire brushing, masonry drilling, wood boring, and other operations.

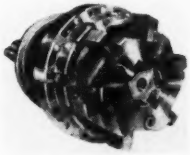
According to the manufacturer, the motor runs continuously under any and all conditions and cannot be burned out, due to the fact that the instant the torque load on the drive spindle builds up to a certain point, the rotary action is changed, through the impact mechanism, into 2,000 sharp, powerful blows per minute. The normal clockwise rotation can easily be changed by turning the rear end cap. The tool weighs 6¾ lb. and has a universal a.c.-d.c. motor for 115-volt operation.

A variety of accessories, such as sockets, bits, chuck adapters, and so on, is available.

the "label" tells you it's unique
See the Gerotor name-plate on a hydraulic pump and you know what's inside . . . the renowned Gerotor mechanism. It minimizes friction, wear and slippage . . . assures higher efficiency at lower operating cost. Eleven sizes, some for pressures up to 1200 p.s.i. continuous, 1500 p.s.i. intermittent. Specify Gerotor!
Gerotor May Corp., Box 86, Baltimore 3, Md.
GEROTOR
HYDRAULIC PUMPS

Special Head for Various Operations

By combining boring, counterboring, and facing blades with conventional tap chasers in a 7-inch ALT



Landis Special Tap Head

Tap Head, The Landis Machine Co., Waynesboro, Pa., has developed a special head which can be used for performing four operations with one chucking.

The workpiece is bored, counterbored, and faced with the tap chasers collapsed. Upon com-

DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

DRILL and PILOT BUSHINGS
Frictionless —Rotary
For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.
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TAPER REAMERS for all types of die work

- Specially treated for modern die steels.
- Rapid cutting capacity.
- Large range of standard sizes.
- Tapers per inch: .005, .008, .013.

Write for data sheets.

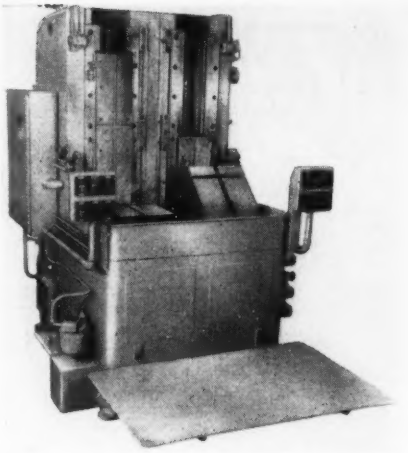
GAMMONS • HOAGLUND CO.
MANCHESTER 2, CONN.
Manufacturers of helical taper pin, chucking, die makers and special reamers.

pletion of this operation, the tap is withdrawn from the workpiece and the tap chasers are expanded. The thread is then tapped on the surface previously bored. According to the manufacturer, leadscrew feed is recommended for both the tapping and boring operations to assure long tool life and a quality finish.

Certain limitations as to the diameter and design of the hole to be bored, faced, and tapped are said to be necessarily imposed.

Broaching Machine Features Relatively Short Stroke and Light Tonnage

Designated as the SBD-30-4, a dual-ram surface broaching machine having a 30-inch stroke and a 4-ton capacity has been added to its line by American Broach & Machine Co., Ann Arbor, Mich. According to the manufacturer, the relatively short stroke and light tonnage of the machine make it ideal for the surface broaching of small parts at a high rate of production. Tilting work tables provide convenient loading positions for parts.



American SBD-30-4 Dual-Ram Surface Broaching Machine

The machine can be set at either an automatic or semi-automatic cycle, and all electrical and hydraulic circuits conform to J.I.C. standards.

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ACME INDUSTRIAL COMPANY

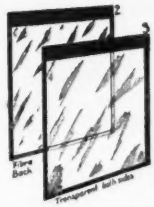
212 N. Laflin St., Chicago 7, Illinois

MANUFACTURERS OF STANDARDIZED DRILL JIG AND FIXTURE BUSHINGS

T-slot Bolts

The world's best . . . one-piece, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 30". Typical direct prices for 10" lengths: ½—$1.36; ⅝—$1.36; ¾—$1.58; ⅞—$1.89. Write for price list.

THE O K TOOL COMPANY, MILFORD 4, NEW HAMPSHIRE



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Two styles. No. 2 with fibre back, No. 3 transparent both sides. Non-inflammable acetate windows. Special style or size to order.

Write for details.

WADE INSTRUMENT COMPANY

Dept. M, R.F.D. No. 1, Chardon, Ohio

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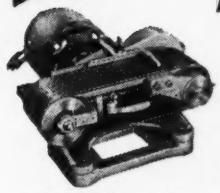
DOES IT FASTER

SIMPLEX-M

ABRASIVE BAND GRINDER



The precision of a machine tool plus the durability of a workhorse. Complete with ½ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

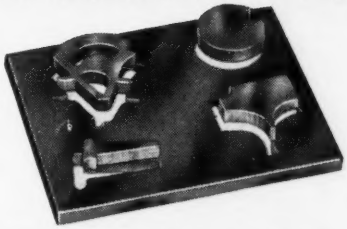
OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING—WRITE TODAY

WALLS SALES CORP.

333 Nassau Avenue, Brooklyn 22, N.Y.

Atlantic

CONTOUR BANDS



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Roughness Comparison Specimens Simplify Checking of Surface Finishes

Roughness comparison specimens, also known as "surface sticks," which are said to provide an accurate means of determining smoothness or roughness of a surface have been announced by Acme Industrial Co., 212 N. Laflin St., Chicago 7, Ill. Said to be simple and easy to use, the sticks consist of various surface specimens individually finished to definite microinch readings and grouped together in handy finish-comparison bars. The operator merely holds the specimen bar opposite the work to make a fast, accurate visual comparison check of surface roughness, waviness, and lay.

Acme Roughness Comparison Specimens in use

The specimens can be furnished in approximately 1 x 1-inch round plug form and in approximately 1 x 1½ x 1-inch rectangular blocks, in boxes accommodating 3, 5, or 8 assorted surface finishes.

Collet Is Self-Cleaning

Sheffer Collet Co., Traverse City, Mich., has announced a self-cleaning collet which is designed for use on automatics, turret lathes, and other machines where the collet is used in a rotating spindle. The self-cleaning feature of the collet consists of an inclined plane on the following edge of each slot face that pre-

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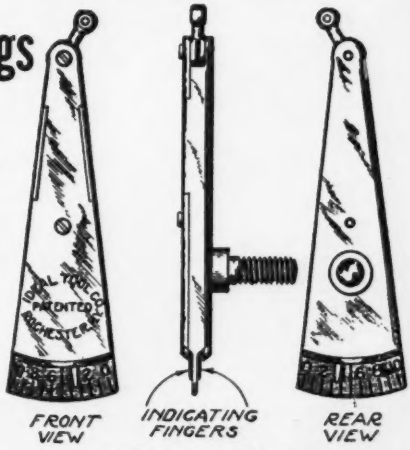

Price . . . $6.00

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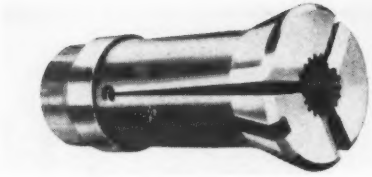

Sheffer Self-Cleaning Collet

vents coolants and cutting oils, along with solids picked up by the solutions, from collecting in the slots and forming a sludge. The angular surfaces of the slot faces act as fan blades which forcibly repel foreign matter. The self-cleaning feature is available on all Sheffer collets if specified by the user.

Tool Is Designed to Disconnect Roller Chain

Designated as the Model CBT60, a chain breaking tool which is said to be capable of disconnecting any pitch roller chain having from ¼ to ¾-inch pitch has been announced by Boston Gear Works, 14 Hayward St., Quincy 71, Mass. The jaws of the tool are made of Pearlitic heat-treated malleable iron. The pressing tip is made of case-hardened tool steel, and all other vital parts are heat-treated. The tool measures 5½ inches in length.

Boston Model CBT60 Roller Chain Breaking Tool

In operation, the roller link of the chain to be disconnected is inserted between the jaws of the tool. The adjustable lever is turned, forcing the pressing tip to push the pin through the pin link plate. The process is repeated on the pin at the other end of the same pin link plate, and the chain is then disconnected.

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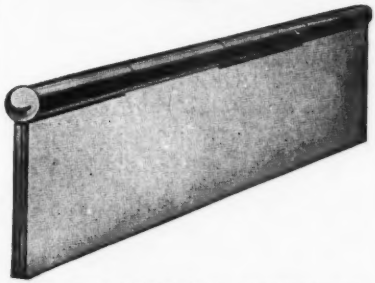

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High-Temperature Lubricant

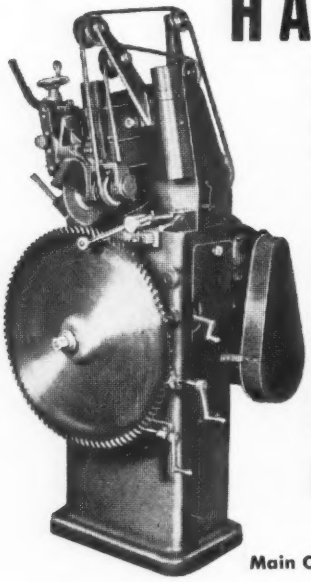
Designated as "Molykote" M-30, a dispersion of near-colloidal particles of Molykote powder suspended in a polyalkylene glycol vehicle for use in high-temperature applications, such as oven chain lubrication has been announced by The Alpha Corp., 174 Hamilton Ave., Greenwich, Conn. According to the manufacturer, in this application the polyalkylene glycol vehicle allows the Molykote particles to be carried into the most inner recesses of the chain where the wear is most prevalent. The vehicle is said to dissipate under the heat and a smooth, tenacious film of Molykote is attached to the pins, bushings, and rollers.

Molykote M-30 can be applied by brush or oil can. If the lubricant is to be used in automatic lubricators, the manufacturer recommends that the agitator type of lubricator be employed, since there is a slight settling in the dispersion.

Nibbler Performs Wide Variety of Operations

Eric S. Johnson Co., Dept. MMS, 230 E. Ohio St., Chicago 11, Ill., has introduced the GV Nibbling Machine which, with the aid of a few simple tools and attachments, is said to be capable of performing beading, straight cutting, folding,

GV Nibbling Machine



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For Automatic Grinding of Cold Metal Saws.
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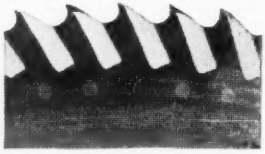

Two Views of High and Low Toothed Metal Cutting Saws

FOR INSERTED TOOTH, SEGMENTAL TYPE, SOLID TOOTH CIRCULAR SAWS MADE IN THREE SIZES—MODELS 1130, 1160, 1172 SAW CAPACITIES 8 to 72 inches and larger.

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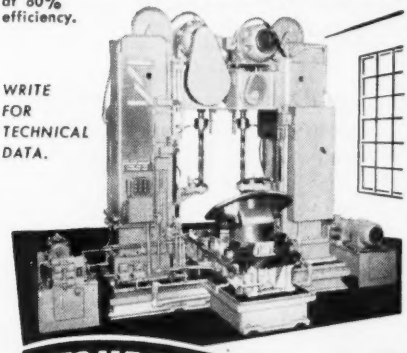

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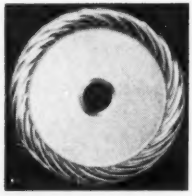
joggling, circular sawing, slot cutting, nibbling, irregular or free-hand cutting, and louver cutting operations. The tools, it is claimed, are easily changed and quickly installed, and the mechanism is enclosed, operating in an oil bath. According to the manufacturer, the nibbler is designed to cut practically any material within its capacity, such as mild steel, stainless steel, aluminum, brass, copper, fiber, and so on.

The machine is offered in three sizes, the cutting capacity on the Junior model being $\frac{1}{8}$ inch, on the Medium model $\frac{3}{16}$ inch, and on the Senior model $\frac{5}{16}$ inch. Throat depths are 28½, 40, and 49 inches, respectively. Each model is supplied with an electric motor for 220 or 440-volt 60-cycle 3-phase current; circle cutting tools; straight cutting tools; folding and beading tools; adjusting gages; and necessary spanners. Other tools are available for special operations.

Cutter Is Designed to Mill Compound Contoured Surfaces

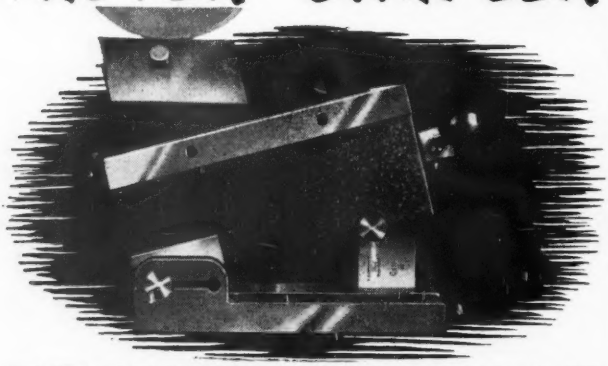
Douglas Tool Co., 2300 E. Nine Mile Rd., Hazel Park, Mich., has announced a high-helix shear-type milling cutter which has a cutting surface of more than 90 degrees and which is



Douglas High-Helix Shear-Type Milling Cutter

designed to mill compound contoured surfaces. According to the manufacturer, the teeth of the cutter are always in contact with the workpiece, they clean themselves, and they impart a smooth finish. The milling cutter is said to be well suited for cutting turbine compressor blades, stator vanes, buckets, and generating cams. A special adapter, it is claimed, makes it possible to use the milling cutter on practically any type of milling machine.

FASTER-SIMPLER



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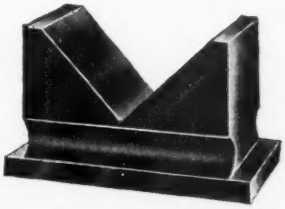

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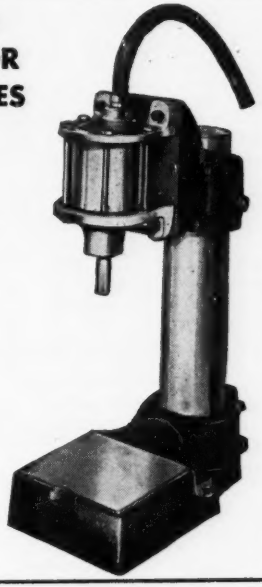

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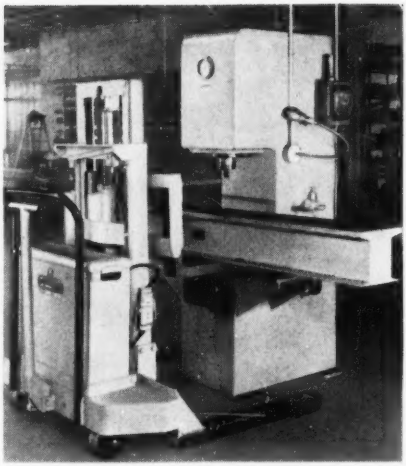
Multi-Purpose Lifting Unit Is Designed for Small Shops

Designated as the "Hydrolift" Model HHL a straddle-type stacker which is designed for small shops and which has a capacity up to 2,000 lb. has been announced by Lift Trucks, Inc., 2429 Spring Grove Ave., Cincinnati 14, Ohio. According to the manufacturer, the unit is ideal for handling pallets, skids, dies, drums, barrels, and sacked goods, as well as for numerous other non-routine jobs. The unit utilizes a power hydraulic lifting mechanism, and is said to be light in weight and highly maneuverable.



"Hydrolift" Model HHL Straddle-Type Stacker being used for placing an I-beam in a straightening press

The Hydrolift is designed to operate in a limited area; however, for occasional long hauls, a coupling can be provided on the unit for movement with a small powered tractor. The unit is said to be capable of stacking in a 5-foot aisle.

Solenoid Air Valve Has Built-In Speed Controls

Designated as the Bantam, a ¼-inch 3 or 4-way solenoid-operated air valve having adjustable speed controls which produce fast or slow movement of the cylinder ram in either direction has been announced by Air Fixtures, Inc., Dept. 70, North Manchester, Ind. According to the manufacturer, the valve is fast oper-

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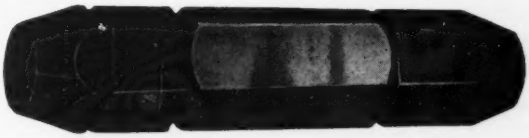
Bushings for cylindrical and thread plug gages.



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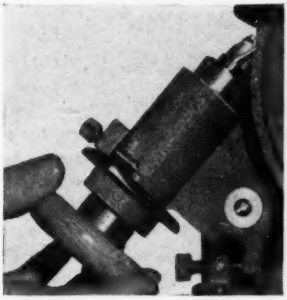

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DRILL GRINDER
with WEB THINNING ATTACHMENT

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Black Diamond **SAW & MACHINE WORKS, INC.**
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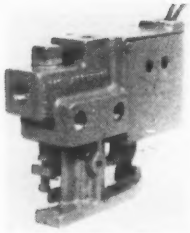


Bantam ¼-Inch Solenoid Air Valve

ating and is built for long wear. The valve incorporates stainless steel exhaust seats, brass inlet seats, and phosphor-bronze springs.

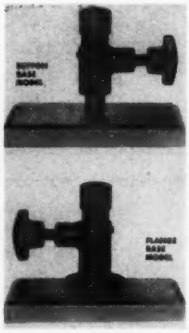
The Bantam is available with either 110 or 120-volt constant-duty solenoids and will operate a double or single-acting cylinder.

All-Purpose Spring Jack Is Versatile Work Support

Lodding, Inc., Dept. N 72, 79 Beacon St., Worcester 1, Mass., has announced an all-purpose standard-model spring jack which is designed as a versatile work support for materials or parts being machined.

Operation of the spring jack, it is claimed, is easy. A plunger, actuated by a spring, is said to make contact with the work without requiring manual pressure. After contact is established, the plunger is locked by a hand-operated screw. A hardened shoe registers against the tapered section of the plunger, preventing any movement.

A dust cap on the jack is claimed to protect the working mechanism against chips and dust. All parts of the jack are coated with Parkerized jet black finish to resist rust, and the plunger and shoe are made of hardened and ground tool steel. The jack is available in a button base and a flange base model, as shown in the accompanying illustration.



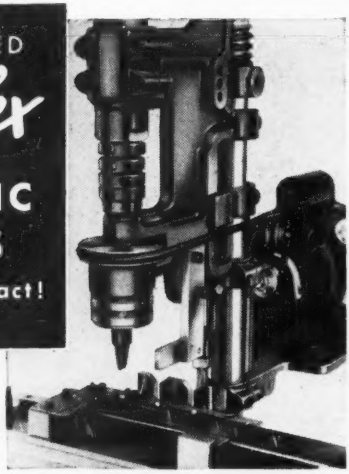
Lodding All-Purpose Spring Jacks

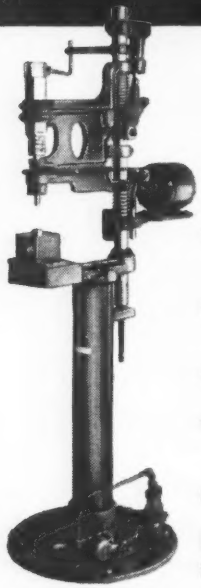
NEW IMPROVED

Airflex

PNEUMATIC RIVETERS

with rotating impact!





SAFER PRECISION RIVETING on All Types of Materials

★ Controllable impact eliminates bent rivets, loose joints, flaking metal, broken work pieces, etc.

★ Strikes as it spins — subjects only small cross-section of rivet head to force of blow.

★ Engineered for precision adjustment to fit the job. Fully tested.

★ Choice of models—interchangeable hammer units and peens—in rivet sizes from 1/16" to 1". Thousands in use.

Send for bulletin with complete listing.

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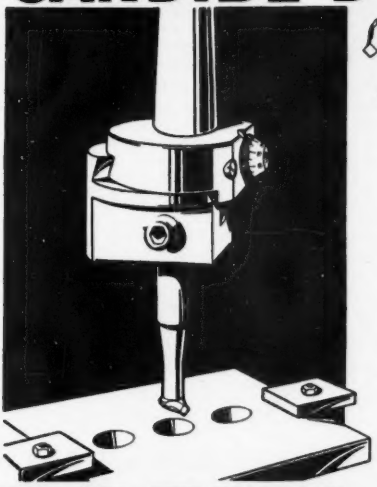

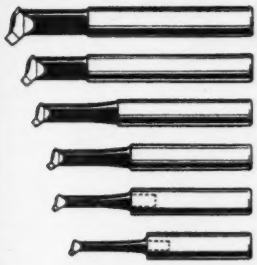

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Most standard sizes in four popular carbide grades are

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Low cost, immediate control of dust from one remote dust source, or from a whole shop!

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No obligation.

Lathe Work Driver Consists of Three Eccentric Jaws with Floating Spring Action

The Skinner Chuck Co., 210 Edgewood Ave., New Britain, Conn., is now distributing the +GF+ (George Fisher) lathe work driver which consists of three eccentric jaws (six on the largest size) which have floating spring action to accommodate smooth or rough bars and forgings. A smooth protective hood covers all mechanisms and also acts as a manual opening and closing device for the jaws. A slight turn of the hood opens the jaws and holds them open until the workpiece is placed between centers. A clockwise turn of the hood releases the jaws to grip the workpiece. According to the manufacturer, any increase in tool pressure and spindle speed automatically increases the holding power of the driver. The jaws are said to be reversible to accommodate the direction of rotation of the spindle.

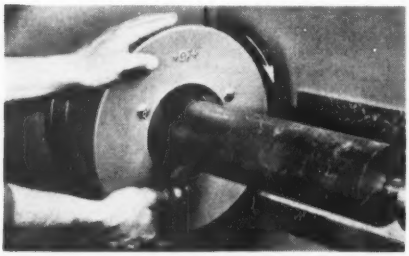

Illustration showing +GF+ Work Driver being adjusted to grip a workpiece

The work driver is available in five standard types; namely, Type 36 with a capacity from ½ to 1 1/16 inches, Type 60 with a capacity from 5/8 to 2 3/8 inches, Type 90 for from 5/8 to 3 5/8 inches, Type 140 with a capacity from 7/8 to 5 5/8 inches, and Type 200 with a capacity from 4 7/8 to 8 1/8 inches.

Improved Dial Indicator Is Said to Be Adaptable to Any Height Gage

Homestrand, Inc., Larchmont, N. Y., has announced the availability of an im-

Chicago MOUNTED Wheels

...now even better with 79E BOND

the new miracle grinding wheel bond

Greatest selection of sizes and shapes for every application. Best of all, deliveries are good . . . ready when you need them.

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CHICAGO WHEEL & Mfg. Co.
Dept. MMS, 1101 West Monroe Street, Chicago 7

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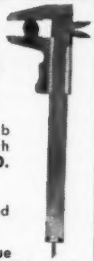

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Guaranteed Accuracy

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Finest made! With automatic thumb lock...**$10.50.** Also model 55A in inch and metric scales with set screw..**$9.50.** Prices F.O.B. New York.
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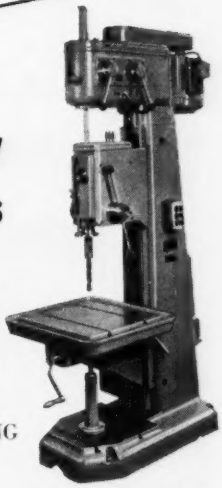
Price Complete
$1985
Delivery from Stock

ALFING Heavy-duty drill presses



Quick changeover from job-to-job on short or long run heavy-duty drilling production is assured by easily adjustable head and table on ALFING DRILL PRESS.

Crank *raises* or *lowers* table; headstock moves 6" up or down by hand on scraped ways. Easy-to-reach controls cut handling time, too. 9" quill-supported spindle stroke, driven by 3½ h.p. V-belt motor. Motor speed 900 rpm. Drilling capacity of 1" in steel; 1¼" in cast iron. 8 spindle speeds from 150 to 1640 rpm. Drilling feed by hand or power. Table surface 26"x28". Scraped base plate may be used as table for extremely bulky work pieces. Distance between spindle and table, 23" max.; spindle and base plate, 25" - 40". Write for descriptive literature.

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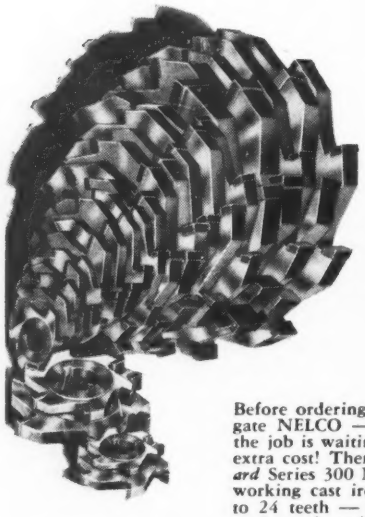

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NEARLY 800 DIFFERENT NELCO TOOLS ARE REGULARLY STOCKED TO FILL 90% OF ALL SPECIAL TOOL APPLICATIONS!

Before ordering costly *special* cutters, investigate NELCO — chances are the tool to do the job is waiting — without delay! Without extra cost! There are, for example, 47 *Standard* Series 300 Nelco Side Milling Cutters for working cast iron, brass and bronze. 6 teeth to 24 teeth — diameters from 3" to 12" — teeth graduated from 3/32" to 1" in width — from 1" to 2" hole diameter. Throughout the entire Nelco line, this same versatility and utility holds true. Other *standard* Nelco carbide tools in stock — saving dollars on special cutters — include

- 130 Different Side Milling Cutters
- 37 Different Slitting Saws
- 171 Different End Mills
- 21 Different Slab Milling Cutters
- 40 Different Face Milling Cutters
- 25 Different Shell End Mills
- 189 Different Carbide Tipped Drills

SEND TODAY FOR THE NEW NELCO 48 PAGE CATALOG

NELCO TOOLS For that Extra EDGE in Production

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

Midget-Size Socket Wrenches and Parts

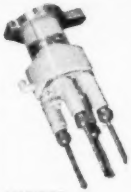
The Billings & Spencer Co., Laurel St., Hartford, Conn., has announced the addition of midget-sized socket wrenches and parts, designated as the "Midget Series," to its line of standard wrenches and shop tools. The Midget Series is drop forged from Vitalloy steel and features a ¼-inch square drive. Sockets are available in six-point (single hex) and eight-point (double square) styles. Six-point openings cover a

Billings "Midget Series" Socket Set

UPPING PRODUCTION, CUTTING COSTS . . . EVERYWHERE!

Precision-Built MIDGETS

Aiman's Multiple-Spindle DRILL HEADS



MIDGET

2-3-4 Adj. Spindle

¾" to 2½" Center Distance. Collet size up to 3/16". For small presses only.

2-3-4-6 Adj. Spindle

1¼" thru 8½" Center Distance. Will handle up to 9/16" drills. Precision machined.

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Special Units

Built to your specifications for drilling or tapping. Write today for details.

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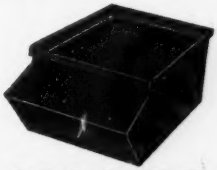

Sterling Bin Front "Top Rim" Steel Stacking Box. Size: 18" x 12" x 6".

THESE BOXES AGAINST ANY!

Once you use and compare Sterling stacking boxes, you'll know why we invite comparision in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box . . . no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

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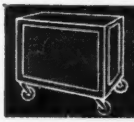
Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.

Sterling "Top Rim" Steel Stacking Box with drop handles. Size: 18" x 12" x 6".



Sterling

Quality Handling & Storage Equipment

size range from $\frac{3}{8}$ to $\frac{7}{8}$ inch inclusive and eight-point openings range from $\frac{1}{4}$ to $\frac{3}{8}$ inch. Parts and accessories include basic items such as sliding T-handles, extensions, and an adaptor, as well as a small ratchet (reversible) and a wood-handled screw driver-type spinner.

The socket wrenches and parts are available singly or in four different sets, the sets being packaged in heavy-gauge metal boxes. The largest set includes a complete set of open-end electrical wrenches with openings in sizes from $\frac{1}{16}$ to $\frac{1}{2}$ inch.

NEW SHOP LITERATURE

"Maintenance of Alloy and High Speed Cutting Tools" is the title of a booklet (No. 10), released by The Carborundum Co., Dept. MM-81-35A, Niagara Falls, N. Y., which provides information on how to choose the right grinding wheel for each job.

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LUCIFER ELECTRIC FURNACE

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Furnace Size	2000°	2300°
6x 6x12"	$467.00	$548.00
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18x18x36"	1419.75	1629.50

Complete with 100% automatic electronic controls.

1 SAVE with a Lucifer Electric Furnace on FIRST COST. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces...feature by feature ...you'll save money on the Lucifer Electric Furnace EVERY TIME.

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Sole Manufacturers of Lucifer Electric Furnaces

Turret Lathe Tools. A 197-page illustrated booklet released by Warner & Swasey Co., Dept. 320M, Cleveland 3, Ohio, fully describes its line of turret lathe tools. The booklet tells how to select turret lathe tools and how to improve setups. Sections on universal bar and chucking equipment, special tools, repair parts, and data are included.

"Riveting with Hi-Shears" is the title of a 60-page three-color pocket-sized booklet released by The Hi-Shear Rivet Tool Co,. 8924 Bellanca Ave., Los Angeles 45, Calif., providing rivet gun recommendations, installation and removal data, inspection and riveting hints, and additions to Hi-Shear rivet numbers. The publisher states that the booklet is now serving as a main training aid for Hi-Shear riveting classes in the educational departments of aircraft manufacturers and subcontractors.

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The Standard Steel Specialty Company, a pioneer in the machine rack field, has brought an accuracy and finish to this product that cannot be matched by any other company.

This rack is made from special machinery steel finished to our specification . . . cut by expert mechanics on machines designed especially for this work.

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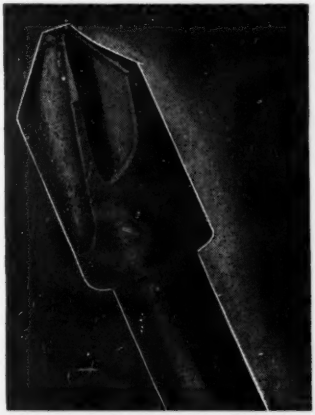

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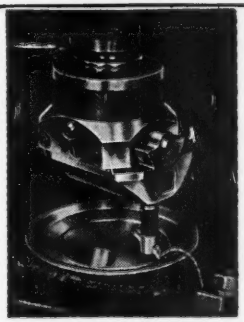

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ONE Set Up

...for boring, facing, turning, recessing, undercutting.

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THE BORING HEAD THAT THINKS FOR ITSELF

Featuring: automatic feeds, end release and return; adjustable stop; adaptable to all standard machines; highest precision; ideal for jig borers; seven models for work up to 24" diameter.

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Reamer Selector. A sturdy pocket-size reamer selector released by Lavallee & Ide, Inc., Chicopee, Mass., lists 143 hole sizes from 0.0400 through 0.5010 inch which can be reamed with standard L & I Reamers. The selector includes catalog numbers and equivalent sizes for easy ordering.

Balancing Manual. Bear Mfg. Co., Dept. M-25, Rock Island, Ill., has issued a "Dy-Namic" Balancing Manual which tells how to easily, quickly, and economically balance rotors, armatures, crankshafts, and any other part that turns, weighing from 4 oz. to 8 tons. The manual also tells how to reduce wear, eliminate noise and vibration, and improve the all-around performance of the finished product.

Milling and Center Drilling Machines. A four-page three-color bulletin (No. 2000) released by The Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland 13, Ohio, fully describes and illustrates its 3-station duplex milling and center drilling machines. Information on features of the machines, line drawings, general specifications, milling head specifications, and drill head specifications are included.

Drills at your fingertips—

HUOT DRILL DISPENSER

Why rummage through a box full of drills when the Huot Drill Dispenser will keep them sorted by sizes? Each compartment holds many drills—several dozen in the smaller sizes. Beautiful light gray hammerlin baked enamel finish. *Made in three models for fractional, number and letter drills.*

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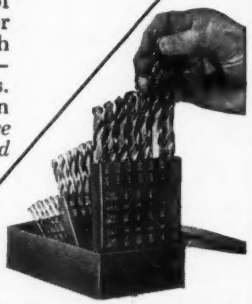

HUOT DRILL INDEX

The simplest filing system for all twist drills. Panels fold into container like pages of a book. Seventeen models for drills from No. 80 wire gauge to 1-inch size.

HUOT

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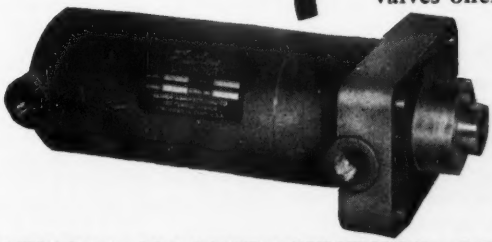
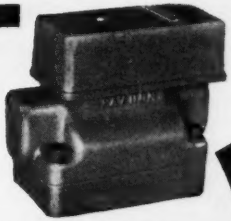
High-Speed Portable-Electric Grinders. A 12-page two-color catalog issued by The McGonegal Mfg. Co., Railroad Ave. & Mozart St., East Rutherford, N. J., fully describes and illustrates its line of "Themac" high-speed portable-electric grinders with circumferentially adjustable grinding spindles for use on any size lathe. Construction details, complete specifications, and a price list are included.

Notching Units. A 20-page three-color catalog (No. N) issued by Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y., fully illustrates and describes the complete line of Wales independent self-contained notching units which are said to be capable of notching mild steel up to ¼ inch thick. Various set-ups are shown, and complete specifications and dimensional drawings are included.

Pathon

2000 P.S.I. HYDRAULIC CYLINDERS . . . VALVES





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CUTTER GRINDING FIXTURE

RUGGED! RIGID! ACCURATE! LOW-COST UNIVERSAL CUTTER GRINDING FIXTURE

fits any universal tool or surface grinder. Here's the answer to your cutter and tool grinding problems.

PRECISION BALL END MILL grinding is done easily with this flexible and compact instrument, it grinds up to 2¼" dia., sets at any angle or radius with any cutting clearance on square, conical or ball nose shaped end mills.

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Export Office: States Trading Co., 401 Broadway, New York 13, N. Y.
Cable Address: STRADESO, N. Y.

Portable Hardness Testers. A 20-page two-color illustrated catalog covering its line of portable hardness testers has been published by Ames Precision Machine Works, 29 Ames St., Waltham 54, Mass. The catalog includes information on Rockwell hardness testing; a chart of Rockwell hardness scales; a description of penetrators; and data on anvils, accessories, and equipment furnished. Also included is an explanation of how to use the Ames Portable Tester and interesting views showing testers in actual use.

CARROLL
DIVIDING HEADS

3 SIZES — 4 MODELS — 6" to 12"
CARROLL DIVIDING HEAD CO.
3525 Cardiff Ave., Cincinnati 9, Ohio

Cutter Grinder. Mico Instrument Co., 73 Trowbridge St., Cambridge, Mass., has released a four-page illustrated catalog describing its cutter grinder which is said to be a carefully designed portable grinding machine of wide application. Complete specifications and prices are included.

Work Drivers. Seneca Falls Machine Co., Seneca Falls, N. Y., has published an illustrated bulletin (No. D-43) fully describing and illustrating its self-centering quick-acting work drivers which are designed for use on any engine or multiple-tool lathe and for certain work on turret lathes and grinding machines.

Combination Shearing, Punching, and Coping Machine. A 10-page two-color illustrated bulletin released by Kling Bros. Engineering Works, 1328 N. Kostner Ave., Chicago 51, Ill., fully describes its combination shearing, punching, and coping machines for shearing plates, angles, or bars; punching in or coping angles; and notching, cutting, and mitering operations. Information on the features of the machines and attachments, detailed engineering data on capacities, and specifications are included.

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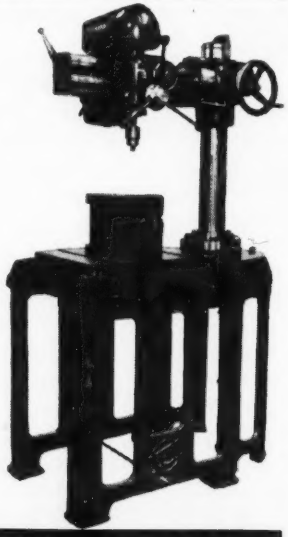
Sensitive
Universal
RADIAL DRILL



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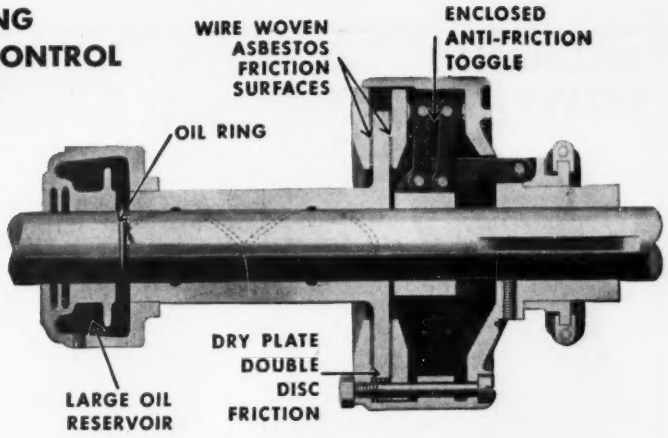

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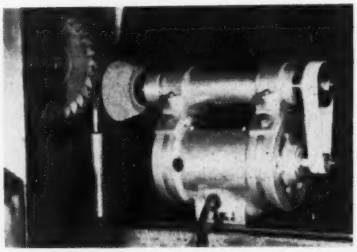

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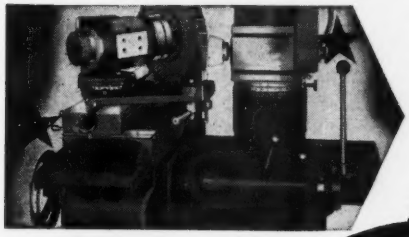

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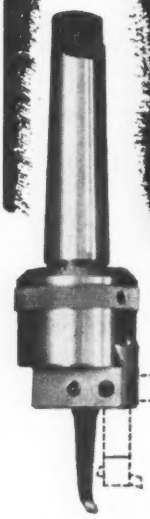

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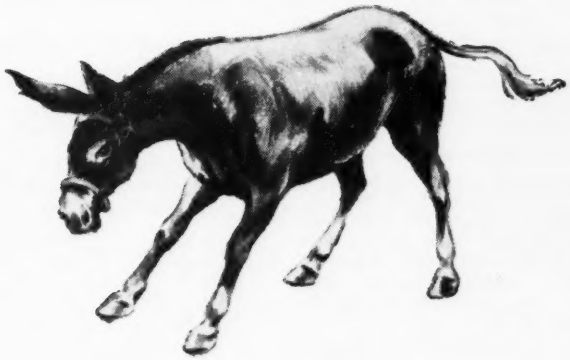

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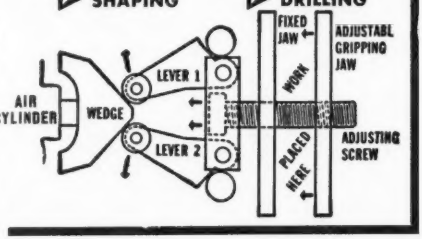

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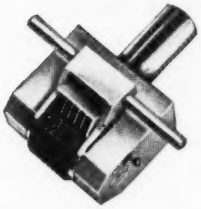

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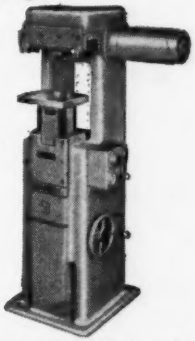

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Grinders and Lathes. A four-page two-color catalog issued by Amlintool, Inc., 17 Beckley Ave., Stamford, Conn., describes and illustrates toolroom and cutter grinders, toolmaker lathes, and turret lathes. Information on features and attachments, as well as specifications, is included.

Expanding Tool Bit. Expanding Bit Corporation of America, 207 Market St., Newark, N. J., has issued a 12-page two-color catalog (No. 1-53) which fully describes and illustrates its expanding tool bit which can be used in tools for milling machines, special machines, boring machines, automatic and semi-automatic screw machines, drill presses, and turret lathes for performing a wide variety of boring, facing, turning, grooving, threading, and flycutting operations. Application information, complete specifications, and a price list are included.

Milling Machines. A four-page two-color bulletin released by Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y., describes and illustrates the Steinel Milling Machine which is available in vertical and horizontal models. Complete specifications for each model are provided.

Toolroom Lathe. A six-page two-color bulletin (No. 5302CD) released by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind., fully describes and illustrates its 16-inch 12-speed toolroom lathe. Brief specifications and a partial list of features are included in the bulletin.

Utility Vises. A four-page two-color bulletin (No. 23Y) released by Brown Engineering Co., 120 N. Third St., Reading, Pa., fully describes and illustrates its line of utility vises which are designed for use on drill presses, millers, grinders, shapers, and other machinery. Information on construction features and typical uses are contained in the bulletin, as well as specifications on the two sizes that are available.

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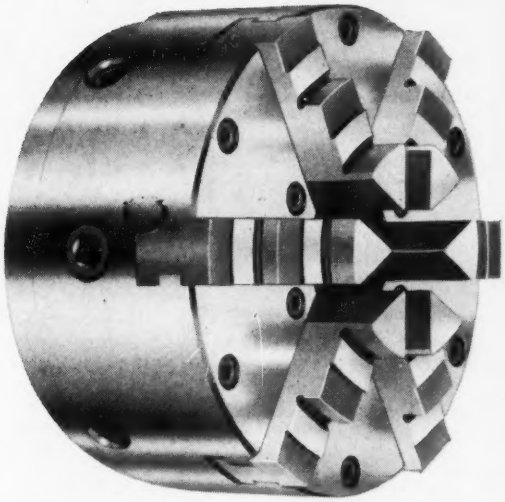

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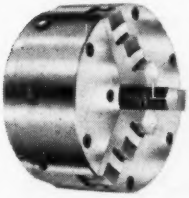

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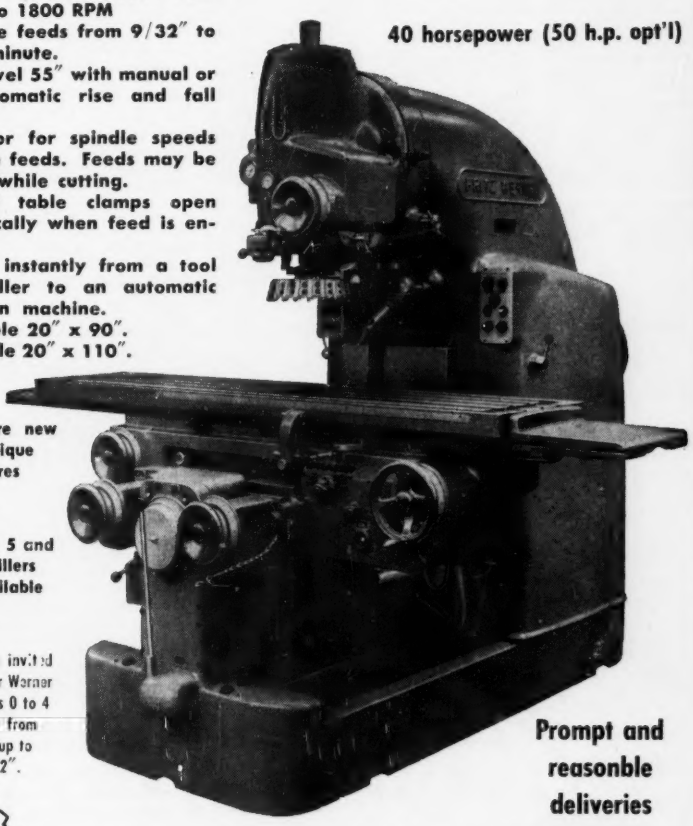

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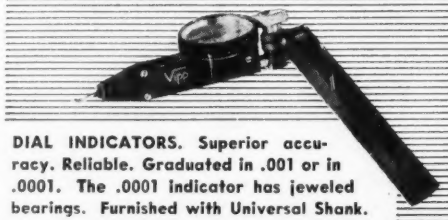

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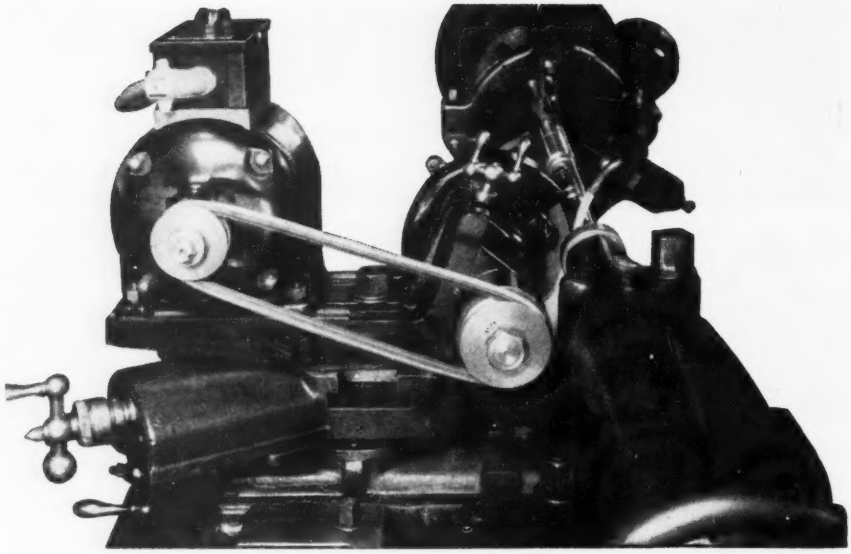

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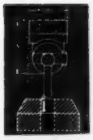

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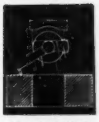

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the last word

What About Tomorrow?

SIGNS are beginning to appear on the industrial horizon that point to important changes in metal-working activities during the coming months.

Those men who are closest to these activities—executives of technical organizations which are the sounding boards of industry—warn that a period of competitive selling lies directly ahead. This period of competitive selling will affect not only the manufacturer of end or consumer products but also the manufacturer of the tools and equipment required for the manufacture of those products.

For a long time the demand for many products has been so great that some manufacturers did not feel the need for making any extensive changes or improvements. Now as we find backlogs of new orders receding, particularly in the metal-working field, more time will be devoted to the improvements which will offer more productive equipment than ever before.

We cannot overlook the fact that a considerable amount of the metal-working equipment in our plants today was designed and built during the post-depression days of the thirties. The vast production arsenal of World War II was stocked largely with machines built during this period.

Following the war, there was a short breathing spell during which a few manufacturers did make extensive changes in their machines and equipment, but even these were cut short when the Korean War began. The outlook now is for a lull, a time for consideration of mechanical improvements or design changes to provide greater productivity.

We emphasize the factor of greater productivity for herein lies the most potent argument for sales in the coming months. Obsolete or worn out machinery and equipment must be replaced. When it is replaced, it will be with equipment that offers more production at lower cost.

So, whether you are concerned with the manufacture of a consumer product or whether you are making tools to sell to the manufacturer of the consumer product, it would be most timely to make those long delayed improvements now.

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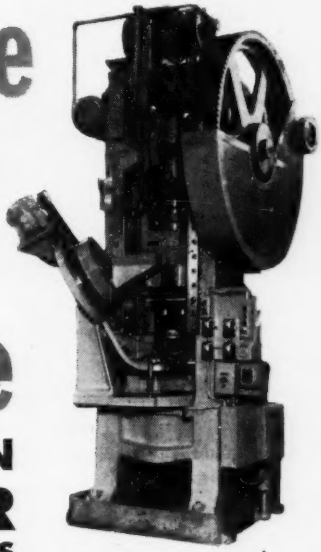

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Photo Courtesy E. W. Bliss Co.

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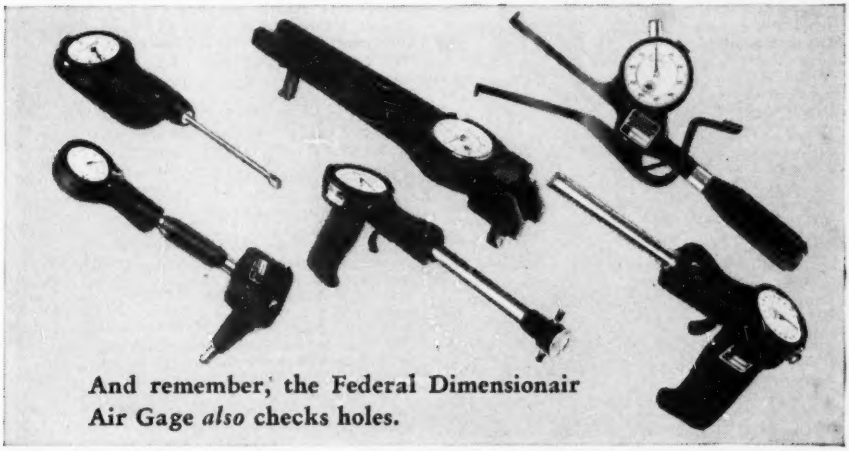

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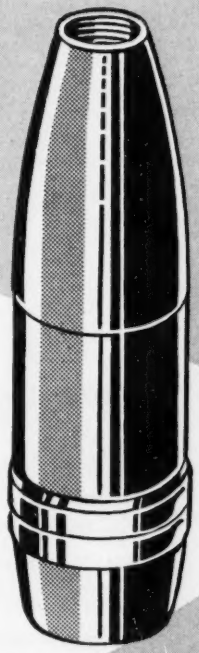

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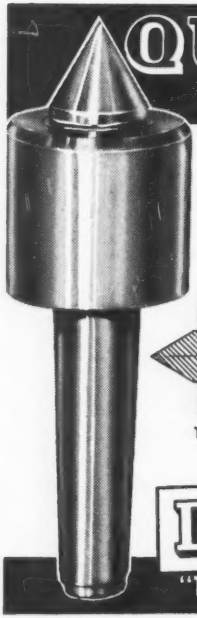

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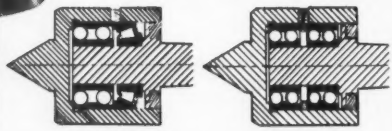

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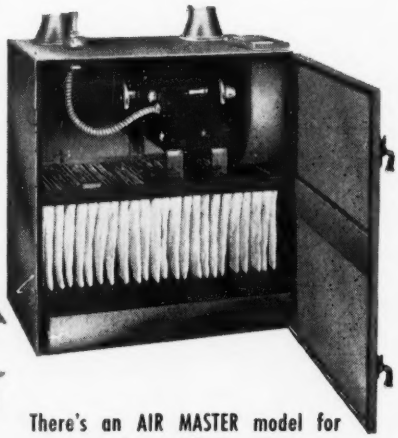

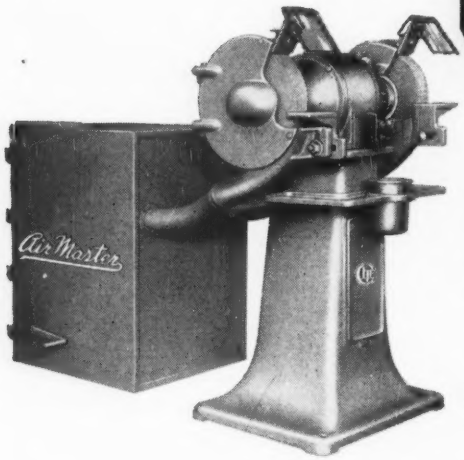

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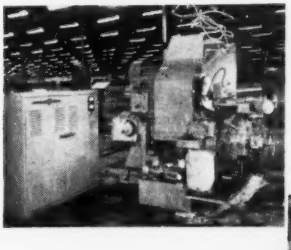

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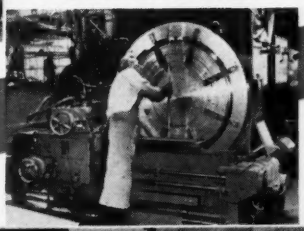

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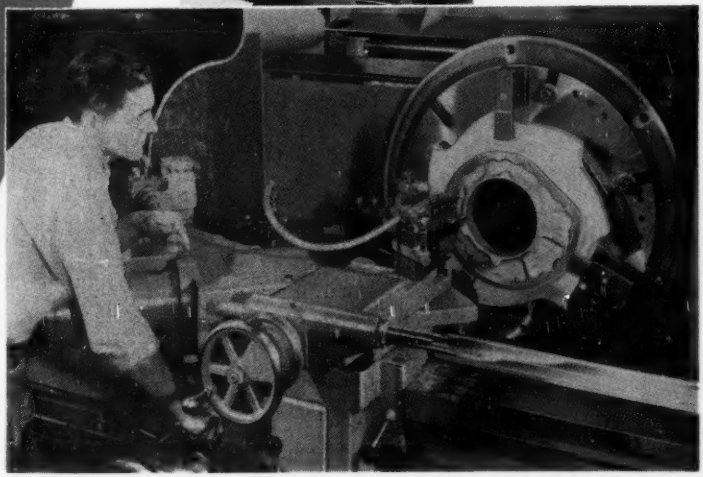

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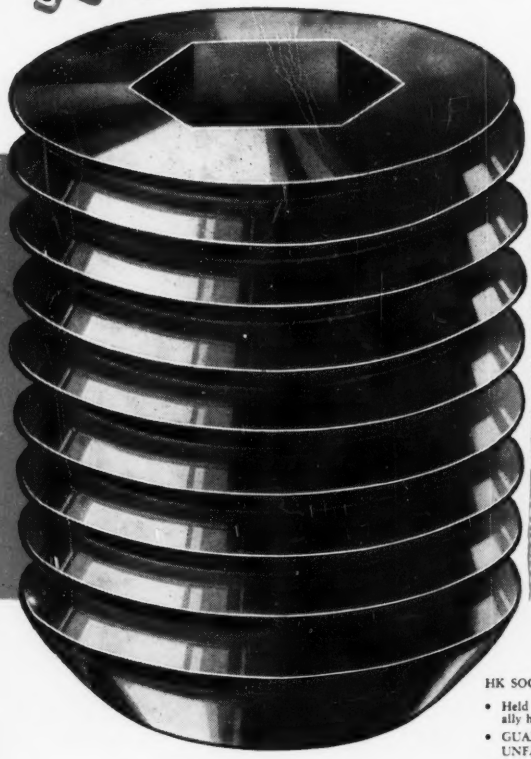

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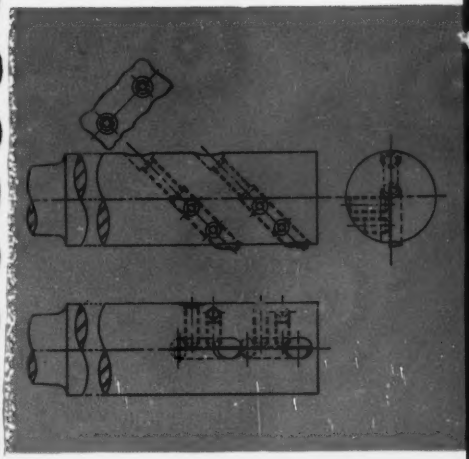

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